HORTICULTURAL ABSTRACTS

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SALIENT ITEMS, Vol. 30, No. 4.

EDITOR'S NOTE

The end of Salient Items:—It has been decided, though not without some reluctance, that this must be the last occasion on which Salient Items will appear in *Horticultural Abstracts.* The plain fact is that, in its thirtieth year, *H.A.* is considerably larger than ever before, and there is no sign that this growth process can be checked, let alone reversed. As the journal has grown in size, so has it taken progressively longer to edit, and so also has it taken longer to select and reassemble the material used in Salient Items. The time has arrived when something must go, and, although on occasion the temptation to give up editing is strong, it must obviously be resisted.

Although in future it will be "abstracts only", every effort will be made to help the reader to find what he is looking for by expanding the list of contents where necessary, by extending cross-referencing and by improving the already detailed subject indexes.

ENVIRONMENT

Atmosphere:—As if pests and diseases were not daunting enough, the array of atmospheric hazards grows most formidable. The evil effects of ozone, however, can be reduced by several chemical antiozonants (not the pleasantest of neologisms) (5615), and those of smog by reducing soil moisture (5698). The reactions of numerous test plants to fluorine injury are described (4665), and similar work on lime and cement dusts is also recorded (4663). Even atmospheric moisture is not blameless, as it apparently causes russeting in apples (4927). With tomatoes windy weather brings to an end sub-oxidation, which may be the cause of vascular browning (5618). Supplementary carbon dioxide, on the other hand, may be of value in improving yields and plant health (4698).

Soil:—Studies on radioactive strontium indicate much variation in the extent of uptake from the soil, and the ability of certain plants to accumulate large quantities causes disquiet (4697, 5341, 6292). Another form of soil pollution is from sodium and calcium chlorides used to thaw ice on roads in winter, a practice which may sometimes injure roadside trees (5913).

Temperature:—In addition to any immediate damage it may cause frost may have an insidious latent effect, as was observed in certain Russian apple trees, which apparently recovered from a frost in 1955–56 only to show wilting in the dry spring of 1959 (4872). Amongst factors which may affect frost hardiness are a free draining soil (4867), pruning (4869), day length (5972) and the application of phosphate (5985). Other related studies include one on the use of tetrazolium chloride to assess frost damage (4871) and one on forecasting (4646). In contrast to frost hazards the problem in glasshouses may be to reduce the temperature, air cooling for example resulting in 30% better assimilation in roses (4808). The design and orientation of glasshouses greatly influence temperature control (4807).

Light:—Reducing the light intensity has reduced yields of tulip bulbs (5873) and increased the susceptibility of squash plants to CMV infection (5419). By contrast, increased illumination has increased the biological value of the protein in spinach and lamb's lettuce (6295). Supplementary lighting may be an economic proposition with several crops, including tomatoes (5581, 5582), but its value may vary a good deal with the time of year and even the time of night when it is applied (5326). The colour of artificial light provided is also important, both in relation to plant age and to the type of growth required (4708, 5583).

GROWTH AND REPRODUCTION

Basic plant processes:—An endeavour to interpret all the life processes of plants in terms of accumulated temperature sums provides food for thought (4905). In other papers the metabolic processes of higher plants are described in terms of rhythmic fluctuations related to light and darkness (4704, 4705). Among other environmental factors limiting growth are the rate of oxygen diffusion in the soil (5589) and the water balance in the leaves (5663).

Flowering:—The dropping of leaves and buds by trees can occur on a prodigious scale, as is illustrated in counts made on orange trees, which revealed that 3268 leaves were shed by a single tree in one day and that 99·8% of the flower buds failed to form fruits (5992). Of the many environmental factors affecting flowering the compaction of the soil has not received much attention, although it is now shown that looseness of soil may advance flowering in chrysanthemums and also cause blooms normally incurving to become reflex in at least one variety (5817).

Pollination:—Bees are discriminating creatures preferring quality to quantity in nectar (5020) and showing partiality to ultra-violet light (4803). Apple and pear pollen can be given electrical treatment to improve fruit set (4922). With some vegetables a shortage in the supply of pollen may be offset by providing pollen from other species to stimulate fertilization (5345). In cacao self-incompatibility has been overcome by mixing the incompatible pollen with compatible pollen (6120), and in radishes by introducing pollen into the stigmas below the surface in which the inhibiting action lies (5538). Developments in pollen storage have been turned to good account by papaw growers, who can remove early fruit and so induce the formation of late flowers, which, when hand pollinated, produce valuable out-of-season fruit (6185).

Growth substances:—It is hopeless to attempt to evade the flood of papers on gibberellin and, while breasting the tide, some rewarding flotsam may be encountered. The treatment of vines to produce less compact bunches of larger grapes may be well on its way to commercial application (5065–5067). Although several growth substances affect the sex ratio in cucumbers (5407), GA has been particularly useful in causing female strains to produce staminate flowers and so permit inbreeding (5408). The bewildering array of effects on all sorts of plants tested include advanced flowering in several ornamentals (4723–4725). The effects of GA, however, may be influenced by temperature (5610) and by photoperiod (5894), but not apparently by IAA (4727). Endogenous gibberellin-like substances have been studied once again in lettuces and beans (5440, 5485). Finally, it seems that treated plants may unselfishly share their GA with their untreated neighbours by exuding it from their roots (4726). Reports on other growth substances include an effect of IAA in retarding flower abscission in tobacco caused by leaf removal (5685), and the presence of an IAA-like substance in adhering peaches at the time of fruit fall (4933). A new growth reducing phosphonium compound may be useful with chrysanthemums (5820). A useful point emerges from work on the use of NAA for apple thinning; apparently weak varieties require a fine mist spray and vigorous ones a heavier application (4926).

MACHINERY, EQUIPMENT AND METHODS

Machinery and practical equipment:—Bulk harvesting and handling of fruit is again well covered: items of particular interest include a mechanical harvesting assembly for citrus (6038), a water-dumping system for apples (4956), an automatic pallet bin filler for apples (4957) and shaker-catcher harvesting methods for apricots and peaches (4943, 4944). There are further developments in the equipment for pruning, hedging and topping orchard trees (4785, 5996–5998), although some may prefer to "prune" their lemons with maleic hydrazide (5999). Equipment is also described for orchard heating (4657, 4794), spraying and dusting (4788–4790). An interesting report describes the sub-surface application of volatile herbicides, which has proved more economical than surface spraying (5238). Less typically "machine-age" is the simple but effective system of soaking a blanket with a herbicide preparatory to dragging it over the weeds (5249). Other equipment includes a subsoiler modified to grub trees (4783), a dredger for narrow ditches (4784), a seed scarifier which improves the germination of leguminous seeds (4792), light-controlled switches for temperature regulation and for irrigation or misting control (4800, 4798) and air purification equipment for stores (4742, 4743).

Research equipment:—For soil moisture determination (4688, 4802), calibrating sprayers (4791) and evaluating low-volume, oil-based sprays on a small scale (6097).

Methods:—A variant of the patch method of indexing for virus infection consists in grafting patches from a sensitive but virus-free variety of apple onto trees suspected of carrying stem-pitting virus (5112). Laboratory methods for determining the susceptibility of strawberry varieties to *Botrytis* include testing the fungal growth and spore germination in the presence of the fruit juice (5147).

Pitfalls:—When measuring the light falling on plants in photosynthesis studies account should be taken of the fact that only certain wavelengths are effective for this process (4769). Acaricide testers are warned that red spider mites are distributed contagiously and not randomly on apple tree leaves, although this finding makes a simplified evaluation procedure possible (5167). Warning is also given that clonal materal of tea is so specific in its requirements that the results of experiments in which it is used may not be very widely applicable (6249).

NUTRITION

Diagnosis:—In coffee foliar diagnosis has provided a fair measure of nutrient status as determined in field experiments (6156, 6158), but in cacao only limited agreement has been found between leaf analysis and soil analysis (6116). In another cacao study it was observed that the correlation between leaf-N and yield was positive and significant only in the open and at wide spacing; contrariwise, the leaf-P and yield correlation was negative in the open and positive under shade (6115). The need for caution is also evident from the results of studies on carnations, in which normal uptake was influenced by photoperiod (5808), and on pears, in which it was influenced by season, variety and rootstock (4898).

Choice of anions:—With pineapples sulphate of potash may give higher yields of larger and better quality fruit than the chloride (6190), and in apples magnesium appears to be taken up more rapidly and dependably from the chloride or nitrate than from the sulphate (4895), although in this fruit the type of potassium salt used apparently has little effect on composition (6295).

Trace elements:—Boron is well documented in two general papers (4693, 4694), and in three others on relationships with other elements. Thus spinach responded to Cu only when B was added (5544), B combined with both Mn and Zn improved strawberry yields and quality (5001) and it may also interact with Al in the nutrition of swedes and lettuces (5336). Cobalt has again increased yield and quality in vines (5082). Copper deficiency in company with Al toxicity still features as a possible cause of cadang-cadang disease of coconuts (6142). The translocation of foliar-applied Fe can be inhibited by high levels of several other elements, and pH also comes into the picture (5439). In studies on the effect of dolomitic limestone dressings on apples the well-known antagonism between K and Mg was found in the leaves but not in either the bark or the roots (4894). Manganese toxicity has been ameliorated by applied Al, although P deficiency may result from this (5772), and also by low concentrations of chelated Fe (5796). Lastly, the usefulness of Na as a plant nutrient is shown in studies with carrots, in which Na not only could replace K, when the latter was deficient, but also improved K uptake and translocation when it was present (5528).

Nutrients and plant ills:—In tea plants Mg-induced chlorosis was less easy to cure when nematodes were abundant (6254). Populations of nematodes under sour cherry trees were less when high rates of K were applied and were negatively correlated with the leaf content of K (5160, 5161). Potash also earns marks with other types of infection, the severity of panama disease of bananas, for instance, being inversely related to K uptake (6098), and mealybug infestation of cacao showing a similar trend (6130).

PLANT PROTECTION

Viruses:—The effectiveness of milk and for that matter of cows' blood for the control of tobacco mosaic virus in tobacco is apparently due mainly to the proteins present (5702, 5703). Milk has now also been used successfully to control TMV in tomatoes (6319). Fermentation is yet another way of reducing TMV infection in tomato seeds (5621). Virus infection in the fruit tree nursery depends on several factors, and formulae have been provided for calculating its incidence (5110).

Fungi:—Work on fungal diseases includes studies of environmental factors. Root rot of oranges can be reduced by heavy irrigation (6023), but panama disease of bananas is apt to be worst with a steady, high soil moisture content (6098). Root rot of beans is influenced by the preceding crops and their residues, possibly because of a relationship with soil bacteria (5444). Within the plant several factors affecting resistance have been noted, including the concentration of sugars (5424) and the phenolic products of interactions between the host and the parasite (5133). The effectiveness of fungicides depends on various factors, including temperature (5841). The toxicity to fungi of the metal cations in a number of fungicides appears to be related to the strength of their covalent binding to the surface ionogenic groups of the fungal protoplast (4759).

Pests:—We sadly note the perversity of nature in a report on a spray programme, which, while it much reduced aphid and mite populations, caused them to redouble their egg laying efforts in the autumn (5176).

Phytotoxicity and residue problems:—The phytotoxicity of fungicides varies with their particle size and frequency of application (5156). The absorption of streptomycin by higher plants and its effects appear to be related to various cations; Ca and Mn limit absorption (4755), while Mg and the antibiotic form a harmful complex with numerous undesirable effects including Mg deficiency (4753, 4754). Bordeaux mixture residues reduce transpiration in coffee (6161), and the decomposition products of captan, but not those of zineb, deposited on vines can inhibit the fermentation of the must (5088). The extent of the residues of aldrin and dieldrin in carrots has been shown to depend on the amount and type of an ethereal oil in the plant (6295). The oil content of vegetable seeds also has a wide range of effects when these are fumigated and stored (4670).

Soil sterilization:—A newly revised booklet (4679) and a new triple-action fumigant (4681).

Weeds:—Variation in the effectiveness of monuron when used at low rates has been attributed to the products of decomposition of soil organic matter, which, combining with it, render it inactive (5292).

PROPAGATION

Seeds:—Various media for stratifying fruit seeds have been tested; for apple and pear seeds coal ash has given good results (4851), whereas for stone fruit seeds moss seems preferable (4861).

Cuttings:—There are plenty of pointers towards better results with cuttings: an automatic mist system with every mod. con. is described (4674), plastic tents and polythene sheaths have proved helpful (4675, 5795) and nutritional aids range from more N and less K for the parent plants (5816) to vitamins B_1 and B_6 for the offspring (5911). Photoperiod must also not be neglected, since carnation cuttings from short-day stocks root better than those from long-day stocks, despite a preference for long days during the actual rooting process (5807). Rooting in apple cuttings apparently depends largely on the extent of hard sclerenchymatous tissues in the secondary phloem, which have an adverse influence (4907).

Practical aids:—Clips rather than ties for grafters (5943) and a mobile unit for potters (4793).

MISCELLANEOUS

Collar seem tight?:—More goitrogenous cabbages (5392).

Fruit coatings:—Polythene emulsion for grapefruit (6043).

Good and evil:—Effects of asparagus and ailanthus on their fellow plants (4719, 4883).

Good news for gourmands:—Edible fungi from coffee-pulp (5495).

Washing machines:—Best not emptied in the garden (4686).

MISCELLANEOUS.

General.

4639. ANON.
Physical development of agricultural production in the Union. Horticulture.
Economic development of agricultural products. Field husbandry.
Economic development of agricultural products. Horticultural products.
Fmg S. Afr., 1960, **36**(2): 41-8, illus., 54-74, illus., and 75-91, illus.

These three articles review various aspects of development in South Africa. The first covers fruit and vegetable growing, the second includes sugar, tobacco and wattle bark production, and the third deals with the various vegetable and fruit products.

4640. VAN SOEST, W.
Ontwikkeling en perspectieven van de Nederlandse glastuinbouw. **(The development and prospects of horticulture under glass in Holland.)**
Landbouwk. Tijdschr., 1960, **72**: 185-94.

A historical review, with production figures; vegetables are the most important products.

4641. LAPIN, P. I.
The Central Botanical Garden [Moscow]. [Russian.]
Vestn. s.-h. Nauki, 1960, **5**(2): 100-5, illus.

A short account of the history and work of the Garden, which co-ordinates the activities of 75 botanical gardens in the U.S.S.R.

4642. GURSKIJ, A. V.
The botanic gardens and reservations of China. [Russian.]
Priroda, 1960, **49**(3): 79-84, illus.

Established as scientific institutions only in recent years.

4643. HAYES, S. F.
Horticultural training in Scotland.
R. Caledon. hort. Soc. J., 1959, reprinted as *Misc. Publ. Edinb. School Agric.* **227**, pp. 7.

Development and present-day facilities.

4644. KOSTELIJK, S.
De saldo-methode als hulpmiddel bij de bedrijfseconomische voorlichting. **(The balance method as an aid to advisory work in farm economics.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1960, **23**: 15-19.

The method is based on calculation of the difference between gross proceeds and a change in costs (due to a change in acreage, cultural practices, etc.). Its possible application to horticultural holdings is discussed.

4645. ANON.
Judging standards for horticultural shows.
Publ. Alberta Dep. Agric. **19**, reprinted 1960, pp. 16.

Useful hints for organizers and judges of flower, fruit and vegetable shows.

Climate and air pollution.

(*See also* 4794, 4818, 5615, 6292, 6296, 6304.)

4646. LAWRENCE, E. N.
Forecasting grass minimum and soil temperatures under clear skies and light winds.
Met. Mag., 1960, **89**: 33-42, bibl. 6.

4647. VAN LOOKEREN CAMPAGNE, P.
Zijn er mogelijkheden in de nachtvorstbestrijding? **(What are the possibilities for night frost protection?)**
Fruitteelt, 1960, **50**: 368-71, illus.

A discussion on the use of sprinkler irrigation, smoke production, heaters and wind machines in orchards.

4648. DE ZEEUW, J.
Enige grondslagen van de nachtvorstwering. **(Some principles of night frost protection.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1960, **23**: 301-5, bibl. 2, illus.

Under Dutch conditions wind machines are of little use for frost protection because there is negligible inversion. Burners which give off heat mainly by convection provide insufficient protection, but those that heat mainly by radiation may be satisfactory. Sprinkler irrigation has proved the most satisfactory method in Holland [see also *H.A.*, 29: 312n.]

4649. VAN MARLE, G. S.
Stoken van turf ter bestrijding van nachtvorstschade. **(Burning peat for protection against night frost damage.)**
Fruitteelt, 1960, **50**: 471.

Orchard heating by burning hard peat in metal barrels was tested during a night frost in April. The barrels were spaced 10 × 10 m. apart (i.e. 100 per ha.). At a distance of 2·5 m. from a barrel the temperature increase was 4·5° C. at a height of 1 m., but at a distance of 5 m. it was only 1·5–2·0° C. A closer spacing would therefore be needed for protection against a severe frost. Costs for labour and material were high.—R.T.C., Zutphen.

4650. TEN CATE, H. R.
Beregenen en stoken van turf als middelen tot wering van schade door nachtvorst. **(Sprinkler irrigation and the burning of peat as means of protection against damage from night frost.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1960, **23**: 308-12.

WECA.
Beregenen en stoken van turf ter bestrijding van nachtvorstschade. **(Sprinkler irrigation and the burning of peat for prevention of night frost damage.)**
Fruitteelt, 1960, **50**: 362-4, illus.
Methods of operation and costs are compared.

4651. SANGERS, W. J.
Economische aspecten van de nachtvorstwering. **(Economic aspects of night frost protection.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1960, **23**: 306-7, bibl. 1.
Factors to be considered when deciding whether the purchase of a sprinkler irrigation unit would be justified.

4652. KIDDER, E. H., AND DAVIS, J. R.
Frost protection with sprinkler irrigation.
Ext. Bull. Mich. St. Univ. **327**, revised 1956, pp. 12, illus.
Methods employed to protect vegetables, flowers and small fruits against temperatures down to 20° F. [For first edition see *H.A.*, 26: 1640f.]

4653. VON POGRELL, H., AND KIDDER, E. H.
Experimental study of critical leaf temperature in regard to frost protection by sprinkling.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 615-21, bibl. 15.
Detached bean leaves were cooled in a radiation frost chamber to determine the critical temperature of freezing. Where no other treatment was applied temperatures of 27·5–28·0° F. were reached without injury. Ice coating and mechanical shocks, however, raised the critical leaf temperature. It is recommended that sprinkling should start at 32° F. air temperature, because at lower temperatures ice formation and mechanical shocks of the first wetting can cause much damage. [For earlier work see *H.A.*, 30: 3097 and 3098.]

4654. DE ZEEUW, J.
Sproeien als middel tegen nachtvorstschade. **(Sprinkler irrigation as a protection against night frost damage.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1960, **23**: 43-51, bibl. 7.
Calculations are presented to show the relationship between the rate of cooling of a plant and the amount of heat loss through convection, evaporation and radiation, reference being made to frost protection in orchards and strawberry plantations. It is calculated that, when the temperature falls to −5° C. and there is practically no wind, a precipitation rate of at least 3·2 mm. per hr. is required to prevent frost damage; in windy conditions the required rate may be considerably higher. With a rotary sprinkler the interval between deposits of water on a given sector should not be more than ½ min. longer than the time the water takes to freeze. Spraying should be continued until the ice starts to melt. Factors requiring further investigation are discussed.

4655. WEISE, R.
Wann soll eine Beregnungsanlage zum Frostschutz ein- und wann ausgeschaltet werden? **(When should irrigation for frost protection be switched on and when should it be switched off?)**
Weinberg u. Keller, 1960, **7**: 172-7.
The air temperature of vineyards is more accurately recorded by a wet than by a dry thermometer. The former has a cover which should be wetted with rain water or distilled water in the evening before a frosty night. The application of the readings to frost protection by irrigation is indicated.

4656. HOGG, W. H., AND EBSWORTH, H. R.
Frost protection under cloches by the use of irrigation water.
Exp. Hort., 1960, No. 3, pp. 69-70, bibl. 2.
HOGG, W. H.
Frost protection under cloches.
Gdnrs' Chron., 1960, **147**: 209, illus.
Sprinkling barn-type cloches during radiation frosts with either a rotary rainer or a spray line raised the average minimum temperature 2 in. above bare soil under the cloches by 5·4° F. and reduced the average duration of the frosts by 5·8 hours. Rates of precipitation were not recorded.—Met. Off. and N.A.A.S., Dorset.

4657. CRAWFORD, T. V.
Under-tree wind machine tested.
Western Fruit Gr, 1960, **14**(4): 38, illus.
In a peach orchard this produced a temperature rise of 1° F. over 3·2 acres and 2° F. over 1 acre at 6 ft. above the ground [see also *H.A.*, 30: 184].

4658. RUI, D., AND ROSINI, E.
La sperimentazione antigrandine tecnica e scientifica nel quadro della meteorologia agraria. **(Technical and scientific anti-hail trials within the framework of agricultural meteorology.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 320-47.
A fuller account of work noted in *H.A.*, 29: 1249.

4659. SCHULTZ, H. B., AND KELLY, C. F.
Studies on wind protection efficiency of slatted fence windbreakers.
Calif. Agric., 1960, **14**(4): 3, 11, illus.
Any possible advantage from tilting a windbreak is offset by a loss in height of about 10% for a 65° angle. A slatted fence windbreak with 60% perviousness composed of 1½ in. slats at 2 in. spacing gave more protection than fences with either 50 or 25% perviousness.—Univ. Calif., Davis.

4660. HOGG, W. H.
Measurement of relative shelter at Rosewarne Experimental Horticulture Station.
Exp. Hort., 1960, No. 3, pp. 7-12, bibl. 4, illus.

The degree of protection from the wind afforded by natural features of the land and by artificial fences was investigated. Of the artificial materials tested coir netting was the most effective; lath fences also gave a high degree of protection, but there was very little reduction of wind behind wire netting. Although a fence of iron sheeting appeared to provide good protection, damaging eddies reduced its value for protecting horticultural crops.

4661. SHEPHERD, F. W.
Shelter for horticultural crops.
Exp. Hort., 1960, No. 3, pp. 1-6, bibl. 2.
Trees and shrubs for shelter.
J. roy. hort. Soc., 1960, **85**: 17-27, illus.

Escallonia macrantha, a hybrid cypress (*Cupressocyparis leylandii*), a bamboo (*Pseudosasa japonica*) *Atriplex halimus*, *Ligustrum ovalifolium*, *Olearia* spp., *Elaeagnus* spp., *Cotoneaster lactea*, *Hebe* spp., *Berberis* spp. and *Fuchsia* spp. have proved suitable for use as shelter belts. Their resistance to salt winds and frosts is recorded. Ease of propagation and solidity of the hedge [see also *H.A.*, 30: 1494] were other factors considered in selecting suitable species. Other plants found suitable or unsuitable for particular situations are listed.—Rosewarne exp. Hort. Stat.

4662. DAINES, R. H., LEONE, I. A., AND BRENNAN, E.
Air pollution as it affects agriculture in New Jersey.
Bull. N.J. agric. Exp. Stat. **794**, 1960, pp. 14, bibl. 28, illus.

The damage caused by acid gases, herbicidal drift and oxidants such as ozone is reviewed.

4663. CZAJA, A. T.
Die Wirkung von verstäubtem Kalk und Zement auf Pflanzen. (**The effect of lime dust and cement on plants.**) [English summary 1 p.]
Qual. Plant. Maveg., 1960, **7**: 184-212, bibl. 13, illus.

In order to study the effect on plants of air pollution by dust from lime and cement factories, leaves and stems were dusted experimentally with quick lime and cement particles. When moistened with water the particles showed an alkaline reaction of pH 12, which proved very injurious to the plants. Pulverized limestone or precipitated carbonate, on the other hand, caused only slight injury. The test plants included beets, *Prunus spinosa*, *Corylus avellana*, certain weeds, *Rosa canina* and several ornamental trees.—Bot. Inst. tech. Hochsch., Aachen.

4664. GUDERIAN, R., VAN HAUT, H., AND STRATMANN, H.
Probleme der Erfassung und Beurteilung von Wirkungen gasförmiger Luftverunreinigungen auf die Vegetation. (**Problems of estimating and evaluating the effects of gaseous atmospheric pollution on vegetation.**) [English summary 10 lines.]
Z. PflKrankh., 1960, **67**: 257-64, bibl. 15.

An introductory discussion to a series of papers.

4665. BORSDORF, W.
Beiträge zur Fluorschadendiagnostik. I. Fluorschaden-Weiserpflanzen in der Wildflora. (**On the diagnosis of fluorine injury. I. Indicators of fluorine injury among wild plants.**) [English summary ½ p.]
Phytopath. Z., 1960, **38**: 309-15, bibl. 6.

As a result of 3 years' observations on 59 species of wild plants, 4 susceptibility groups are distinguished on the basis of the macroscopic symptoms of damage (necrosis on the leaf tips and margins, and less frequently in the interveinal zones). *Vitis vinifera*, *Carpinus betula*, *Iris germanica*, *Arrhenatherum elatius* and *Dactylis glomerata* proved to be extremely sensitive. In general, species of the *Gramineae* and the *Polygonaceae* seem to be sensitive, whereas those of the *Labiatae*, *Compositae*, *Papilionaceae*, *Cruciferae* and *Umbelliferae* seem to be very resistant. [From author's summary.]—Forstbot. Inst. Tharandt tech. Hochsch. Dresden.

4666. GARBER, K.
Erfahrungen mit der Blattanalyse bei Rauchschadenuntersuchungen. (**Observations on leaf analysis as an aid to the study of smoke damage.**)
Angew. Bot., 1960, **34**: 33-7, bibl. 12.

A review.

Seeds.

(*See also* 4725, 4792, 4851, 4852, 4861, 5437, 5451, 5467, 5485, 5602, 5607, 5621, 5652, 5735, 5930, 5935, 6223, 6326.)

4667. PORTER, R. H.
Manual for seed technologists.
Publ. Amer. Univ. Beirut 7, 1959, pp. 149, bibl. 189, illus.

Factors affecting and rules for determining seed quality and germination.

4668. HARRINGTON, J. F.
Drying, storing, and packaging seeds to maintain germination and vigour.
Reprint from *Proc. Miss. Short Course for Seedmen, 1959*, [1960], pp. 19, bibl. 7, illus.

Seed moisture in relation to harvesting, drying storing and packaging, using cereal and vegetable seeds as examples.

4669. N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Seed treatment.
Agric. Gaz. N.S.W., 1960, **71**: 42-3, 52, illus.
The methods briefly described for eliminating seed-borne pathogens are dusting the seed with fungicides, steeping the seed in a fungicidal solution and steeping the seed in hot water. Diagrams illustrate a rotary machine for dusting large quantities of seed, and a simple apparatus for hot water treatment for use on the farm.

4670. BLACKITH, R. E., AND LUBATTI, O. F.
The influence of oil content on the susceptibility of seeds to fumigation with methyl bromide.
J. Sci. Food Agric., 1960, **11**: 253-8, bibl. 9.
A number of seeds, including those of peas, beans, cabbages, radishes, carrots and onions, were fumigated at a range of known moisture contents. Germination tests were subsequently carried out and their oil contents determined. The presence of substantial amounts of oil in seeds rendered them only slightly more sensitive to methyl bromide. Oil increased the availability of water present in the seeds, so that the deleterious influence of a high moisture content was enhanced in respect of both fumigation damage and deterioration in storage. Oil in seeds may act as a reservoir for the fumigant, and delays in germination of up to 1 month were encountered at the higher moisture contents. At lower moisture contents fumigation with high dosages did not markedly reduce germination. The estimated lethal doses of methyl bromide for given oil and water contents are listed for the various species. [For earlier work on onions see *H.A.*, 26: 2815 and on peas and beans see *H.A.*, 26: 3768.]—Imp. Coll. Field Stat., Sunninghill, Berks.

4671. BERNHARD, R. A.
Some studies of coumarin and coumarin analogues as germination inhibitors of radish seeds.
Bot. Gaz., 1959, **121**: 17-21, bibl. 10, illus.
The effect of coumarin and 8 coumarin analogues upon radish seed germination was studied. Coumarin itself is a much more effective inhibitor than are the other compounds examined. There appears to be a threshold concentration for normal seedling development in the region of 10^{-3} M coumarin. Plant metabolites such as octanoate, sucrose, glutathione and calcium pantothenate do not appear able to reverse the coumarin inhibition of radish seed germination when present in 10^{-3} M concentration and in the presence of a similar concentration of coumarin. [Author's summary.]—Univ. Calif., Davis.

4672. HENDRICKS, S. B., AND OTHERS.
Photocontrol of plant development by the simultaneous excitations of two interconvertible pigments. III. Control of seed germination and axis elongation.
Bot. Gaz., 1959, **121**: 1-8, bibl. 13.
Action spectra between 4100 and 8500 A for seed germination and radicle elongation were measured for *Nemophila insignis* and *Lactuca sativa* var. Great Lakes and between 6500 and 8500 A for seed germination of *Lamium amplexicaule*. The responses observed are features of the continued excitation of the photomorphogenic pigment in those regions of the spectra where both pigment forms have appreciable absorptivities. [Authors' summary.—For part II see *H.A.*, 30: 47.]—Plant Ind. Stat., Beltsville, Md.

4673. GINDEL, I.
Biological function of fruit.
Nature, 1960, **187**: 42-4, illus.
Experiments carried out on the germination of seeds within sound, whole fruits that had been planted, using indigenous tree species such as the carob, were supplemented by observations on the germination of seeds within various cultivated fruits held in storage, for example apple and avocado. From the results obtained it is concluded that the so-called inhibiting substances, which initially prevent seeds from germinating, change during the course of fruit development into new compounds which favour seed germination. In the avocado fruit there is a change in pH after harvesting from 6·8 to 7·05 at the time when the seed germinates.—Agric. Res. Stat., Rehovot, Israel.

Propagation and nursery management.

(*See also* 4793, 4798, 4799, 4863, 5795, 5807, 5911, 5943, 6308, 6323.)

4674. LOWENFELS, A.
Mist propagation.
Gdn J. N.Y. bot. Gdn, 1960, **10**: 105-7, illus.
Notes on the author's experience with a time-switch unit in a heated plastic greenhouse.

4675. VINOT, M.
Emploi de gaines en matière plastique dans la multiplication des végétaux à partir de boutures. **(The use of plastic sheaths in the propagation of plants by cuttings.)**
Rev. hort. Paris, 1960, **132**: 2207-8, illus.
Brief notes on trials with polythene sheaths, 6–12 cm. in diameter, 15–30 cm. high and 0·036 to 0·2 mm. thick.

4676. NIENAN, R. E.
Successful grafting with beeswax.
Gleanings Bee Cult., 1958, **86**: 654-8, from *Biol. Abstr., Sect. D.* 1959, **33**, Abstr. 27,368.
Seven years' experience in grafting have shown that a beeswax grafting compound consistently

yields better results than do asphalt emulsions. The recommended formula is 1 lb. beeswax, 4 lb. resin, 1 oz. lampblack, 1 pt. raw linseed oil.

4677. LUNDSTAD, A.
Lagring av lignoser. **(The storage of nursery stock.)** [English summary ¾ p.]
Reprint from *Gartneryrket*, 1959, No. 46, pp. 11, bibl. 17, illus.

Deals with refrigerated and ordinary storage under Norwegian conditions.

Soils and composts.

(*See also* 5496, 5497, 6174.)

4678. STRIJBOSCH, T.
Bodemgeschiktheidsclassificatie voor de teelten onder glas. **(The classification of soil suitability for crops under glass.)** [English summary ¼ p.]
Landclassificatie ten behoeve van de groenteteelt onder verwarmd glas. **(Soil classification for vegetable crops under heated glass.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1960, **23**: 215-17, illus., and 286-94, illus.

In the first paper factors to be considered in assessing the suitability of the soil, including possibilities of improvement, are discussed. In the second paper results are given of a soil survey in the Bleiswijk and Bergschenhoek districts of Holland. A type of soil suitable for a cropping programme of early tomatoes and late autumn lettuces is described, and methods of improving less suitable soils are discussed.—R. T. C., The Hague.

4679. MINISTRY OF AGRICULTURE, LONDON.
Soil sterilization.
Bull. Minist. Agric. Lond. **22**, 5th edition, 1959, pp. 49, bibl. 12, illus., 4s.

This edition, published 12 years after the previous one [*H.A.*, 18: 1167], has been extensively revised and enlarged. Steam sterilization still occupies the greater part. As well as descriptions and illustrations of various methods, mechanical and otherwise, used to sterilize glasshouse soils and also smaller quantities of soil, the sections dealing with both principles and practices have been greatly extended. The section on chemical sterilization has been enlarged to include chloropicrin, DD and metham-sodium. A section on the layout of a soil shed, and appendices summarizing points in steam sterilizing, costs of sterilizing, properties of steam and the flow of steam through mains and perforated pipes have been added.

4680. CRÜGER, G.
Erddämpfung oder chemische Bodenentseuchung—ein Kostenvergleich. **(Soil sterilization by steam or by chemical disinfection: a comparison of costs.)**
Reprint from *Rhein. Mschr. Obstb.*, 1960, No. 2, pp. 2, bibl. 7.

A comparison of the costs of the two methods of soil sterilization shows that surface treatment with chloropicrin or Vapam tends to be cheaper than steam sterilization. Chemical treatment is also preferable when labour is scarce, provided the soil can be left unplanted for the necessary time after treatment.—Inst. Gemüsekrankh. u. Unkrautforsch., biol. Bundesanst. Fischenich.

4681. TURNER, G. O.
Trizone, a new triple action soil fumigant.
Down to Earth, 1960, **15**(4): 2-5, 24, bibl. 20, illus.

Trizone, consisting of 61% methyl bromide, 31% chloropicrin and 8% propargyl bromide, has been found outstandingly effective against nematodes, soil-borne diseases and weeds with their seeds. It should be injected into the soil at 140–200 lb. per acre and covered with a plastic tarpaulin for 2–4 days according to temperature. The responses obtained in trials with various crops, including strawberries, vegetables and tobacco, are tabulated.

4682. HOLDSWORTH, M.
A trial of some local soils in Ghana as potting composts.
J. W. Afr. Sci. Ass., 1959, **5**: 57-63, bibl. 6.

Composts made from garden litter, a lateritic soil, a valley drift soil and fertilized beach sand were compared as media for pot cultures, using *Amaranthus viridis* and tomato plants. *A. viridis* grew equally well in compost and fertilized sand. The tomatoes became diseased in the compost and grew more vigorously in the fertilized sand than in sterilized compost.—Univ. Coll. Ghana.

4683. BEESON, M. M.
Sources of organic matter for glasshouse soils.
N.Z. comm. Gr., 1960, **15**(10): 15, 17.

Farmyard manure, peat, straw, sawdust, poultry manure and maize as a green manure discussed.

4684. EGBERTS, H., AND VAN DER KLOES, L. J. J.
Zwartveen in de tuinbouw. **(The use of black fen peat in horticulture.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1960, **23**: 94-101, bibl. 14, illus.

Black fen peat in its natural form is not suitable for horticultural purposes, but requires physical, chemical or biological treatment. Methods of treatment are described. The value of the peat for potting composts, for glasshouse mulching, as a soil supplement and as a soil improver is discussed.

4685. ROHDE, G.
Nutzungsmöglichkeiten der Stadtabfälle zur Bodenverbesserung. **(The utilization of town wastes for the improvement of the soil.)**
Dtsch. Gartenb., 1960, **7**: 92-4.

Methods of composting different types of town waste described.

4686. den Dulk, P. R.
Synthetic detergents in sewage sludge.
Neth. J. agric. Sci., 1960, **8**: 139-48, bibl. 16, illus.

The sulphonate components of detergents have a harmful effect on most horticultural crops, probably because they disturb the water balance in the soil. When the soil contains sufficient absorbing material (clay or humus), the harmful effect is reduced. The adverse effects of increasing concentrations of sulphonates on spinach are described in detail. Other crops adversely affected were endive, tomatoes, cauliflowers, french beans, carrots, lettuces and cyclamen.—Hort. adv. Serv., Wageningen.

Irrigation and mulching.

(*See also* 4798, 4802, 5585.)

4687. Renouf, L. R.
Irrigation of horticultural crops.
Fruit World, Melbourne, 1960, **61**(1): 33-7, illus.

See *H.A.*, 30: 1522.

4688. Bouyoucos, G.
Measuring soil moisture tension by the plaster of paris electrical resistance block method.
Agric. Engng St Joseph, Mich., 1960, **41**: 40-1, bibl. 8.

A new calibration of the block method to read in atmospheres of soil moisture tension or suction.

4689. Clarkson, V. A.
Plastic mulch pays if properly applied.
Amer. Veg. Gr, 1960, **8**(4): 30-1, illus.

Assuming that from ½ to ⅔ of each acre will be covered, the cost of mulching will be $95 to $125 an acre for 1·5 mil. black polythene, which is the most serviceable gauge, plus $5 per acre for machine laying. Suggestions for improving the use of plastic mulches include the use of a 3 ft. film with 4 ft. row spacing and a 4 ft. film with 5ft. spacing; this allows for burial of the edges 2 to 3 in. deep. With adequate irrigation planting on a raised bed is superior to planting in a flat row. If necessary, fields should be irrigated prior to laying the mulch. Overfeeding with N should be avoided as the mulch conserves N. A machine for laying the mulch is illustrated. The market price obtained for mulched slicing cucumbers in 1958 was $1,267 compared with $536 for an unmulched crop.—Union Carbide Plastics Co., Res. Fm, Clayton, N.C.

4690. Clarkson, V. A.
Effect of black polyethylene mulch on soil and microclimate temperature and nitrate level.
Agron. J., 1960, **52**: 307-9, bibl. 20.

Studies were carried out over 3 years using 1½ mil. film 4ft. wide. Maximum and minimum soil temperatures under the mulch were generally higher, an increase of 9° F. at 1 in. soil depth and 1° F. at 6 in. depth being recorded. These temperatures would not harm plant growth, but increases of 20 to 25° F. at the surface of the mulch and 2 in. above it were recorded and such temperatures could cause injury. A study of the movement, leaching and utilization of nitrate-N under the mulch showed that the rate of movement and leaching was markedly reduced.—Union Carbide Plastics Co., Res. Fm, Clayton, N.C.

Nutrition.

(*See also* 5439, 5488, 5504, 5544.)

4691. del Rivero, J. M.
Las "enfermedades" carenciales de las plantas cultivadas en España. (**Deficiency diseases of crops grown in Spain.**)
An. Inst. nac. Invest. agron. Madrid, 1959, **8**: 875-83, bibl. 8.

Contributory factors to nutrient deficiencies of Spanish soils are discussed, and their diagnosis and control are briefly dealt with for various crops, including almonds, carobs, olives, vines, hops, tobacco, deciduous fruit trees and citrus.

4692. Démétriadès, S. D., and Holevas, C. D.
Les carences minérales observées sur les plantes cultivées en Grèce. (**Mineral deficiencies noted in crop plants in Greece.**)
Ann. Inst. phytopath. Benaki, 1959, **2**: 184-92, bibl. 15.

Including deficiencies of Mg, P, Fe, Zn, Mn and B in fruit trees, vegetables and ornamentals.

4693. Borax Consolidated Ltd.
Boron deficiency—its prevention and cure.
[*Publ.*] *Borax Consolidated Ltd.*, London, 1959, pp. 12, illus.

Tables of deficiency symptoms and recommended rates of B application for various crops, including vegetables and fruits.

4694. Wilcox, L. V.
Boron injury to plants.
Agric. Inf. Bull. U.S. Dep. Agric. **211**, 1960, pp. 7, illus.

The symptoms of B toxicity are described and the relative B tolerances of a number of plants are listed. The B content of irrigation water may be reduced by mixing it with water of a low B content, but if this is not possible a B-tolerant crop should be planted. A high B content in the soil may be reduced by leaching with water. Under B toxicity conditions crops will grow better and suffer less injury if adequately fertilized.

4695. Minina, E. I.
A contribution to the problem of the physiological role of molybdenum in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1960, **130**: 461-4, bibl. 24, illus.

Application of Mo improved the growth and development of lettuce plants and reduced their nitrate content. Mo also increased the ascorbic acid content and decreased the glutathione content. The Mo-treated plants had an increased carbohydrate content despite their increased rate of protein synthesis, which indicates that photosynthesis was stimulated. The chlorophyll content was increased by the addition of Mo. The non-protein N fractions were also increased, especially glutamic acid, serine, arginine and glutamine. The glycine and β-alanine contents were decreased by the addition of Mo, whereas the α-alanine content was increased. [For earlier work see *H.A.*, 29: 1077r.]

4696. KRISHNAMURTHI, S., AND RANDHAWA, G. S.
Role of potassium in nutrition of fruit crops —a review.
Indian J. Hort., 1959, **16**: 175-82, bibl. 55.

In temperate and tropical tree and small fruits.

4697. SCHEFFER, F., AND LUDWIEG, F.
Gefässversuche über die Aufnahme von Radiostrontium aus dem Boden. (**Container trials on the uptake of radioactive strontium from the soil.**)
Z. PflErnähr. Düng., 1959, **85**: 244-9, bibl. 6.

The test plants included peas and lettuce.

4698. BRIEJÈR, C. J.
Een verlaten goudmijn: koolzuurbemesting. (**An abandoned gold mine: the application of supplementary carbon dioxide.**) [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1959, **22**: 670-4, bibl. 5.

A review of early work on the subject, with a plea for renewed investigations. There are indications that, in addition to increasing yields, supplementary CO_2 might increase resistance to diseases and pests.

4699. BEAR, F. E. (EDITOR.)
Symposium on bicarbonates.
Soil Sci., 1960, **89**: 241-302, bibls.

The symposium was sponsored by the Western Society of Soil Science and the western section of the American Society for Horticultural Science. The following papers were presented: Carbon dioxide-bicarbonate absorption, accumulation, effects on various plant metabolic reactions, and possible relations to lime-induced chlorosis, by G. W. Miller. An evaluation of bicarbonate-induced iron chlorosis, by J. C. Brown. Possible involvement of dark fixation of CO_2 in lime-induced chlorosis, by W. A. Rhoads and A. Wallace. Assimilation of bicarbonate by roots of different plant species, by A. A. Bedri, A. Wallace and W. A. Rhoads. Relative importance of bicarbonate *vs* carbon dioxide in reactions, including $KHCO_3$ accumulation by bush beans, by R. C. Huffaker and others. Effects of various levels of bicarbonate, phosphorus, and pH on the translocation of foliar-applied iron in plants, by R. C. Doney, R. L. Smith and H. H. Wiebe. Possible relationships of bicarbonate or CO_2 assimilation to cation accumulation by plant roots, by K. C. Bhan and others. Bicarbonate and phosphorus effects on uptake and distribution in soybeans of iron chelated with ethylenediamine di-o-hydroxyphenyl acetate, by V. Q. Hale and A. Wallace. Effect of sodium bicarbonate on the solubility of phosphorus in calcareous soils, by S. R. Olsen, F. S. Wantanabe and C. V. Cole. Behaviour of bicarbonate and SR85 in soils, by R. B. Clark and others. Ammonium bicarbonate in plant nutrition, by J. A. Goss.

4700. WALKER, T. W.
Uptake of ions by plants growing in soil.
Soil Sci., 1960, **89**: 328-32, bibl. 22.

A review of inter-ionic relations.

4701. VEDANI, A.
Nuove acquisizioni e prospettive della concimazione fogliare. (**New achievements and prospects for the foliar application of fertilizers.**)
Frutticoltura, 1969, **22**: 251-4.

A review, briefly covering fruit trees, vines, vegetables and ornamental plants.

Physiology and metabolism.

(*See also* 4769-4771, 5414, 5583, 5584, 6285, 6316.)

4702. SCHWANITZ, F.
Das Ertragsproblem in entwicklungsphysiologischer Sicht. (**The problem of yield in relation to developmental physiology.**)
Züchter, 1960, **30**: 45-56, bibl. 34, illus.

When high yields are a genetic factor, they are usually associated with the gigas character of the whole plant or with individual plant parts. Comparative studies have shown that vigorous growth is generally associated with an increased capacity for the production of growth substances. It appears that, at least in certain cases, an increase in the leaf area resulting from gigas growth, and a consequent increase in photosynthesis, is the main factor leading to an increase in yields. Reference is made to several horticultural crops, including tomatoes, pansies and *Simmondsia chinensis.*—Staatsinst. angew. Bot., Hamburg.

4703. NJOKU, E.
An analysis of plant growth in some West African species. I. Growth in full daylight.
J. W. Afr. Sci. Ass., 1959, **5**: 37-56, bibl. 22.

In pot experiments in Nigeria on 10 species, including tomatoes and castor beans, the leaf area and dry weight were determined on 2 or more occasions. The leaf area ratios (ratio of leaf area to dry weight) were much higher than those found under comparable conditions in temperate zones, and the net assimilation rates were as high if not higher, with the result that relative growth rates were greater than those obtaining in temperate zones. It is suggested that these higher relative growth rates were due to the fact that the higher temperatures in the tropics cause increases in the leaf area ratio, which more than compensate for any depressing effect produced by the higher mean light intensity.—Univ. Coll., Ibadan.

4704. Howe, G. F.
Time course of the photosynthetic induction periods and photosynthetic rhythms in certain higher plants as related to changes in degree of stomatal opening.
Diss. Abstr., 1960, **20**: 3486, being *L.C. Card No. Mic.* 60-752 of 259 pp.

Stomata of Black Valentine bean, coleus and geranium leaves remained open in the dark when supplied with air of near zero O_2 and/or CO_2 partial pressures, but closed rapidly in normal air. After a dark interval of 15–60 min. at low O_2 and/or CO_2 the stomata were generally open and the rate of photosynthesis was high during the first minutes of illumination, but following a similar dark interval in normal air the stomata were closed and photosynthetic rates were low during the light induction period. Following dark periods of 12 hours or longer, 25 minutes were required in the light for stomatal opening in Black Valentine beans and 15 minutes in castor bean plants. Rhythmic fluctuations occurred in the rates of photosynthesis, though the amplitude of these fluctuations often diminished during the first hour of illumination. The stomata were open during the peak and closed during the trough of the cycle. —Ohio St. Univ.

4705. Wilkins, M. B.
An endogenous rhythm in the rate of carbon dioxide output of *Bryophyllum*. I. Some preliminary experiments. II. The effects of light and darkness on the phase and period of the rhythm.
J. exp. Bot., 1959, **10**: 377-90, bibl. 24, illus., and 1960, **11**: 269-88, bibl. 26.

An examination by an infra-red gas analyser of the rate of CO_2 output by excised leaves of 16 species of succulents showed only *Bryophyllum fedtschenkoi*, *B. daigremontianum* and *B. calycinum* (*pinnatum*) to exhibit a clearly defined rhythm. In the second paper the effects of light, darkness and changes in light intensity on the endogenous rhythm of *B. fedtschenkoi* are reported in detail.—King's Coll., London.

4706. Krumwiede, D.
Über die Wirkung von Stark- und Schwachlichtkombinationen auf das Blühen von *Kalanchoë blossfeldiana*. **(The effects of high and low light intensity combinations on the flowering of *Kalanchoe blossfeldiana*.)**
Biol. Zbl., 1960, **79**: 257-78, bibl. 24, illus.

Experiments carried out in natural and artificial light showed that: (1) When a period of high light intensity was followed by 5 hours of reduced day light, the inhibition of flowering was accentuated by increasingly heavier shading at day lengths of 10–12½ hours. (2) The relative effect of shade was smallest at a day length of 11 hours. Above and below that figure the inhibition of flowering became more pronounced. (3) The critical day length could be shortened by about 15 min. by a combination treatment of high and low light intensity (low light intensity = $\frac{1}{5}$ of the full day light). (4) A short shock treatment of high light intensity following a period of low light intensity in the course of a 12-hour combination treatment inhibited flowering. (5) The inhibiting effect of the shock treatment was accentuated by reducing light intensity during the period of low light intensity. (6) Shock treatment of high light intensity also inhibited flowering if it followed a 12-hour period of low light intensity. (7) The effect on petal movement of a 12-hour day, consisting of 7 hours' high light intensity + 5 hours' low light intensity, followed by 12 hours of darkness did not differ from that of a 12:12-hour alternation of high light intensity and darkness.—PflPhysiol. Inst., Univ. Göttingen.

4707. Šul'gin, I. A., Klešnin, A. F., and Podol'nyj, V. Z.
The optical properties of plant leaves in the ultraviolet region. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1960, **7**: 141-4, bibl. 4.

The transmission, reflection and absorption of light of wave-lengths from 330 to 440 mμ by mature leaves were studied in some mesophytic and xerophytic ornamental plants. In the former group absorption averaged 90–91%, and in the latter group and in plants containing anthocyanins it averaged 93%. At the shortest wave-lengths absorption was almost entirely due to the colourless tissues, chlorophyll absorbing only 5–10%. Under natural illumination about 92% of the ultraviolet rays were absorbed, 45% by the colourless tissues, 31% by carotenoids, 18·3% by chlorophyll and 5·6 by anthocyanins. [See also *H.A.*, 30: 46.]

4708. Hahn, I.-M.
Morphologische und wirkstoffphysiologische Untersuchungen an Pflanzen, die bei ausschliesslich künstlichem Licht herangezogen wurden. **(Morphological and physiological studies of plants raised exclusively in artificial light.)** [English and French summaries 1 p. and 1¼ pp.]
Gartenbauwiss., 1959, **24**: 229-64, 363-410, bibl. pp. 6, illus.

Lettuce, spinach, *Coleus blumei* and *Ageratum houstonianum* plants were grown in artificial light under controlled reproducible climatic conditions.

In their younger stages the plants developed best in red light, but as they grew older the addition of blue light to the red became increasingly more necessary. Incandescent light, when applied to plants under red or blue illumination, always had an unfavourable effect on growth. Blue light increased the amount of free biotin in young plants, while red light had a similar effect on older plants. The highest concentration of aneurin was detected in plants grown in blue light, whereas the immature leaves of plants grown in either red or blue light contained the maximum absolute amounts of aneurin. Infra-red light caused a slight increase in the aneurin concentration, and it significantly increased the absolute amount of aneurin irrespective of the basic type of illumination. By gradually diluting water extracts from lettuce plants grown under different forms of illumination, activity curves with 3–4 promotion regions were obtained, the study of which led to the following conclusions: Plants grown in artificial light have all the necessary growth hormones in optimum quantities. The hormones are quantitatively and qualitatively affected by the quality of light, the ratio of substances affecting cell division to those affecting elongation being characteristic of the different forms of illumination.—Inst. Bot., tech. Hochsch., Hannover.

4709. MOHR, H., AND PICHLER, I.
Der Einfluss hellroter und dunkelroter Strahlung auf die geotropische Reaktion der Keimlinge von *Sinapis alba* L. **(The effect of light-red and dark-red irradiation on the geotropic response of *Sinapis alba* seedlings.)** [English summary 14 lines.]
Planta, 1960, **55**: 57-66, bibl. 22, illus.

The negative geotropic response of white mustard seedlings in the dark was greatly increased by irradiation of the seedlings with visible light.—Bot. Inst., Univ. Tübingen.

4710. ANDREEVA, T. F., AND OTHERS.
The influence of light on the formation of nitrogenous substances in green leaves and in leaves deprived of chlorophyll. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1960, **130**: 457-60, bibl. 18.

In experiments with tobacco, beans and some other plants supplied with a 1% solution of N^{15}, from $(N^{15}H_4)_2 SO_4$, for 2 hours in darkness, subsequent illumination led to a larger increase in the amount of N^{15} incorporated in leaf protein than occurred when the plants were kept for a further period in the dark. This effect was evident in the bean leaves up to the time of flowering but not at later stages of development.

4711. KRJUKOVA, L. M., AND KUZIN, A. M.
Distant effect of ionizing radiation in irradiated plants. [Russian.]
Fiziol. Rast., 1960, **7**: 220-2, bibl. 14, illus.

Irradiation of an isolated leaf of *Vicia faba* with X-ray dosages of 10,000 to 25,000 r retarded cell division in the growing points of both shoots and roots and caused a general reduction in plant growth. Removal of the leaf immediately after irradiation prevented this effect on mitosis and growth, from which it is concluded that under the influence of ionizing radiation toxic metabolites are formed in the leaf.

4712. EVANS, N. T. S., AND EBERT, M.
Radioactive oxygen in the study of gas transport down the root of *Vicia faba*.
J. exp. Bot., 1960, **11**: 246-57, bibl. 11, illus.

Movement down the main root was consistent with diffusion of oxygen through continuous gas spaces in the roots. Loss of oxygen to the surrounding tissue was small in the upper parts of the roots. [From authors' summary.]—Hammersmith Hosp., London.

4713. MITCHELL, J. W., SCHNEIDER, I. R., AND GAUCH, H. G.
Translocation of particles within plants.
Science, 1960, **131**: 1863-70, bibl. 58, illus.

A review of the problems involved in the movement of particles with a wide range of sizes.

4714. GARDNER, W. R.
Dynamic aspects of water availability to plants.
Soil Sci., 1960, **89**: 63-73, bibl. 22.

Dynamic concepts as applied to the water relations of plants and soil are examined, with brief references to the work of other authors on tomato transpiration and on soil suction in the root zone of guayule.

4715. FILIPPOV, V. V.
The distribution of biotin and pantothenic acid in the reproductive organs of plants. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 33, pp. 94-101, bibl. 3.

Investigations on vegetables and flowering plants showed that the anthers contain the largest amount of biotin and the pollen the smallest amount. Both biotin and pantothenic acid occur in the pistils, though the amounts vary in different parts of the pistils. The biotin and pantothenic acid contents of inflorescences are $2\frac{1}{2}$ times higher than those of the leaves. In ripening seeds and fruits plastic substances accumulate far more rapidly than the 2 vitamins.

4716. SMIRNOV, A. M., AND OVČAROV, K. E.
Biosynthesis of ascorbic acid in isolated plant roots. [Russian.]
Fiziol. Rast., 1960, **7**: 240-2, bibl. 20.

Evidence that ascorbic acid formation in the roots of carrot, tomato, pea, etc., is independent of the aerial parts.

4717. Smirnov, B. P.
Biosynthesis of higher fatty acids from acetate in isolated chloroplasts of *Spinacia oleracea* leaves. [Russian, with English summary ¼ p.]
Biohimija, 1960, **25**: 545-55, bibl. 19.

In the dark the metabolism of acetate labelled with C^{14} into higher fatty acids required ATP, coenzyme A and divalent Mn, whereas in light the place of ATP was taken by ADP.—Inst. Biol. Petrozavodsk, Karelia.

4718. Ostapenko, V. I.
The activity of oxidising enzymes in some dioecious plants. [Russian.]
Bot. Žurnal, 1960, **45**: 114-16, bibl. 20.

The polyphenoloxidase and peroxidase content in the leaves of *Cannabis sativa*, *Asparagus officinalis*, *Actinidia kolomikta*, *Hippophae rhamnoides* and *Ribes alpinum* differed greatly but was always higher in male than female plants.

4719. Mergen, F.
A toxic principle in the leaves of ailanthus.
Bot. Gaz., 1959, **121**: 32-6, bibl. 12, illus.

The presence of a substance that was toxic to other tree seedlings was demonstrated in aqueous extracts of foliage from *Ailanthus altissima*. The effect of concentration of, and the response to, this extract was tested on 35 species of gymnosperms and on 11 species of angiosperms. Members of all species, with the exception of those of *Fraxinus americana*, were adversely affected. [Author's summary.]—Yale Univ., New Haven, Conn.

Growth substances.

(*See also* 4671, 4780, 4937, 5065-5067, 5145, 5407, 5408, 5440, 5469, 5485, 5545, 5606, 5608-5614, 5684, 5685, 5804, 5819, 5820, 5837, 5894, 5962, 5974, 5999, 6056, 6107, 6108, 6117, 6118, 6127, 6176, 6316, 6319, 6320.)

4720. Eliasson, L.
Growth response of pea roots to 2,4-D applied to the hypocotyl.
Physiol. Plant., 1959, **12**: 834-40, bibl. 9, illus.

A technique for the application of small amounts of solution containing growth substances to the hypocotyl of pea seedlings is described. Small doses of 2,4-D applied in this way caused inhibition of root elongation and swellings on the roots. Washing of the roots counteracted the effect of 2,4-D. The growth response of pea roots to 2,4-D applied in continuously renewed solution and in a small amount of circulating solution was also investigated. The sensitivity of the roots to a given concentration of 2,4-D was found to be greater in the circulating solution. This fact is taken as an indication that leakable, growth-inhibitory substance is formed in the roots in the presence of 2,4-D. [Author's summary.]—Forest Res. Inst., Stockholm.

4721. Brian, P. W.
Influence of gibberellins on plant growth and development.
J. roy. hort. Soc., 1960, **85**: 167-74, illus.

A review, covering history, effects and practical prospects. [See also *H.A.*, 29: 1077e].

4722. Garay, A., and Szilvay, G. M.
Új növenyi hormonok, a gibberellinek. (**New plant hormones, gibberellins.**) [English and Russian summaries 6 lines each.]
Kisérl. Közlem., Sect. C, 1958 (issued 1959), **51C**(3): 95-105, bibl. 54, illus.

A review, in which plant responses are summarized and the preparation of GA is described.

4723. Chakravarti, S. C., and Loshali, J. N.
Effect of gibberellic acid on certain horticultural plants.
Phyton, 1959, **13**: 119-24, bibl. 15, illus.

Observations were made on the effects of GA applied at concentrations of 10, 100 and 200 p.p.m. to shoot apices of the following plants: *Linaria maroccana*: Leaves changed from lanceolate to linear and from being whorled to alternate; flower buds crowded at the apex of inflorescence and flowering advanced 12 days. *Hamelia patens:* Breaking of dormancy and temporary change of leaf form, which did not persist on cessation of treatment. *Lawsonia alba* and *Justicia carnea*: Death of terminal meristems and hence cessation of growth in former, and development of abortive inflorescence in the latter. *Zinnia elegans*: Shortening of internodes followed cessation of treatment.

4724. Leh, H.-O.
Versuche über die Wirkung von Gibberellinsäure auf einige Kulturpflanzen. (**Experiments on the effect of gibberellic acid on some cultivated plants.**)
Z. PflErnähr. Düng., 1958, **83**: 234-44, bibl. 51, illus.

The following plants were treated experimentally with GA: (a) *Pisum sativum*, *Avena sativa* and *Zea mays* by addition to the nutrient solution; (b) *Digitalis purpurea gloxiniaeflora* and *Campanula medium* by spraying plants growing in pots; (c) *Bryophyllum* sp. by submerging the roots in GA solution. Treatment (b) stimulated growth and induced an increase in dry weight.—Inst. Pfl-Ernähr., Bodenchem. u. Bodenbiol., tech. Univ. Berlin.

4725. de León, A., and de Ráfols, W.
El ácido giberélico. (**Gibberellic acid.**) [English summary ⅓ p.]
An. Inst. nac. Invest. agron. Madrid, 1959, **8**: 807-45, bibl. 16, illus.

Gibberellic acid at 5 p.p.m. greatly accelerated the germination of kok-saghyz seeds. The effect was progressively less marked as the concentration was increased, and was comparatively slight for 7, 8, 9 and 10 p.p.m. Similar results were obtained with broad bean seeds. French bean seedling growth was stimulated more strongly by aerosol sprays than by the application of GA to the growing points. Cornflowers (*Centaurea cyanus*), beans, kok-saghyz and antirrhinums responded to GA by about a fortnight's advance in flowering. Greenhouse tomatoes receiving stem injections of 50 p.p.m. GA for 2 weeks fruited 10 days before those sprayed weekly for 7 weeks with the same solution, and 12 days before the untreated controls. Fruiting was advanced by 1 week and fruit size increased by 50–60% by a single spray treatment of the leaves and stems with 50 p.p.m. GA. Spraying younger plants of kok-saghyz with 10 or 20 p.p.m. solutions resulted in larger inflorescences, large pollen grains microscopically similar to those from tetraploid plants, abundant self-pollination and seeds larger than normal, and also increased the number of leaves and the size and latex content of the roots.

4726. Knapp, R.
Wirkung von mit Gibberellin-Säure behandelten Pflanzen auf neben ihnen wachsende Individuen. (**The effect of plants treated with gibberellic acid on adjacent individuals.**)
Naturwissenschaften, 1960, **47**: 285-6, bibl. 1.

Pairs of pea plants were grown in a number of containers, one plant in each case being treated 11 times with a foliage spray of 4 mg. GA (44 mg. in all) during the period when it was 11 to 37 days old. The adjacent untreated plants, as well as the treated plants, developed elongated upper internodes and elongated upper petioles as compared with untreated pairs of plants. It is concluded that the roots of treated plants exuded GA into the soil, from whence it was taken up by adjacent individuals. —Bot. Inst., Univ. Giessen.

4727. Purves, W. K., and Hillman, W. S.
Experimental separation of gibberellin and auxin actions in etiolated pea epicotyl sections.
Physiol. Plant., 1959, **12**: 786-98, bibl. 39.

The results described suggest that the primary actions of GA and IAA are not closely connected.

4728. Michel, B. E.
Indoleacetonitrile-indoleacetic acid synergism in the slit pea test.
Bot. Gaz., 1959, **121**: 95-105, bibl. 16, illus.

An attempt was made to learn why IAN synergizes with IAA in the slit pea test but not in the pea cylinder test by studying the physical responses, the ability of IAN to spare IAA, and the respiratory responses. The slit pea test is less sensitive to IAA than the pea cylinder test. IAN seems to increase this sensitivity to IAA in the former but has little effect on, or slightly reduces, the sensitivity to IAA in the latter. In slit peas IAN appears to produce the same qualitative responses as does additional IAA. One possible action of IAN, a reduction in the destruction of IAA by wound-activated IAA oxidase, was investigated. The evidence is inconclusive: some supports, but most is contradictory to, the idea that IAN synergizes by sparing IAA from IAA oxidase. Both IAA and IAN influence the respiratory rates of pea stem sections. Their separate effects are essentially additive under simultaneous exposure. The patterns of response for both slit and whole sections are so nearly alike that no key to synergism differences was apparent in respiratory behaviour. [From author's summary.]—Dep. Bot., St. Univ. Ia, Iowa City, and Dep. Bot, Univ. Ga, Athens.

4729. Nitsan, J.
Effect of glutathione and alloxan on the photoperiodic response of *Xanthium*.
Nature, 1960, **187**: 81-2, bibl. 9.

At low concentrations glutathione and alloxan promoted floral development in *X. pennsylvanicum*, but at concentrations exceeding $10^{-3}M$ their effect was inhibiting. In low concentrations both substances also promoted apical leaf growth. Concentrations of either substance lower than $10^{-1\cdot5}M$ did not show any detrimental effects on the plants. —Agric. Res. Stat., Rehovot, Israel.

4730. Genkel', P. A.
The distribution of heteroauxin in the stems and roots of plants during geotropic bending.
[Russian, with English summary $\frac{1}{3}$ p.]
Fiziol. Rast., 1960, **7**: 207-13, bibl. 15, illus.

Geotropic bending of the stems of broad beans, pumpkins, peas and some other plants was accompanied by polar orientation of the protoplasm, and its attachment to the cell wall became greater at the place of maximum growth. There was a similar polarization of heteroauxin distribution, both in the roots and shoots, the substance accumulating where growth was the most rapid. During normal growth heteroauxin distribution was uniform.

4731. Lefevre, C. W., and Clagett, C. O.
Concentration of a growth inhibitor from *Agropyron repens* (quackgrass).
Proc. 14th N.E. Weed Control Conf., 1960, pp. 353-6, bibl. 7.

Extracted from dried rhizomes and concentrated by use of paper chromatographic and ion-exchange column techniques.—From *Weed Abstr.*, **9**, No. 837.

4732. Steward, F. C.
Carrots and coconuts—some investigations on growth.
Gdn J. N.Y. bot. Gdn, 1960, **10**: 87-90, 94, illus.

A popular account of the growth of carrot tissue in the presence of coconut milk [see also *H.A.*, 30: 2872].

Packing, storage and marketing.

(*See also* 5355.)

4733. Ministry of Agriculture, London.
Design of horticultural packing sheds.
Fixed Equip. Fm Leafl. Minist. Agric., Lond. **44**, 1960, pp. 7, 6d.

4734. Pinto, J. A. G.
Embalagens de frutas e produtos hortícolas. **(Packages for fruit and horticultural products.)** [French and English summaries ½ p. each.]
Bol. Jta nac. Frut., Lisbon, 1958, **18**: 44-70, illus.

In general, packages for fruit and vegetables should be of light weight and medium size, rectangular in shape with sloping sides, constructed of wood with adequate ventilation spaces, usable without lids, non-returnable and collapsible. Investigations in progress on packaging are outlined. Fruit boxes from various European countries are compared, and the need to standardize pre-packing and packing units is emphasized. [See also *H.A.*, 28: 68n.]

4735. Bennett, L. G.
A study of the impact of prepacking on the fruit and vegetable trade.
Misc. Stud. Univ. Reading, Dep. agric. Econ., **17**, 1960, pp. 54, bibl. 9, 5s.

The development and current methods of prepacking are described. It is concluded that, although the increase in price, which is occasioned both by the cost of packing and by the better quality of the produce packed, might reduce demand, the aggressive sales policy of the supermarket-type store, which is one of the main outlets, might offset this, thus resulting in benefit to the grower. Advantages to the retailer are outlined.

4736. Organization for European Economic Co-operation.
Pre-packaging for fruit and vegetables.
Publ. EPA/OEEC **10**, 1959, pp. 159, illus., 9s.

This is a report by numerous authors of the European conference and exhibition held in London in 1958. The present position regarding pre-packaging is described for 11 O.E.E.C. countries, and, in a technical section, materials and equipment, standards of quality and of containers, economics and future trends are discussed.

4737. Smith, T. B., and Valldejuli, J. J.
Fresh produce prepackaging practices in the United States.
Mktg Res. Rep. U.S. Dep. Agric. **341**, 1959, pp. 111, bibl. 11, illus.

During each recent season 46 different fresh fruits and vegetables have been prepackaged at various stages from the point of production to the retail store. Sizes and types of package have become fairly well standardized throughout the country; for example, a 10-oz. cellophane bag is most popular for spinach and a 4-lb. polythene bag for apples. All aspects of grading, washing, drying and filling, as well as labour needs and costs, are dealt with in detail.

4738. Mezzetti, A.
L'impiego dell'energia atomica nella conservazione della frutta fresca. **(The possible use of atomic energy in storing fresh fruit.)**
Inf. fitopat., 1960, **10**: 2-7, illus.

The author surveys the present somewhat meagre knowledge on the subject and gives certain examples of definite success achieved in preventing penicillium breakdown in stored lemons. He concludes that such work is merely in the exploratory stage which necessarily precedes exact scientific tests. Immense quantities of radioactive slag containing β- and γ- rays are now available, but there is great difficulty in acquiring knowledge and permission to extract these rays and test them for their possible beneficial use in storage. The problems will be to determine the non-lethal but efficacious doses required for different purposes and later to find whether eventually such rays can be economically used. A table is provided showing the tolerance to such rays of oranges, lemons, peaches, grapes, strawberries, bananas, grapefruit, onions, potatoes, sweet potatoes and carrots and of a number of fungi, bacteria and insects, which normally cause damage in stores.

4739. U.S. Department of Agriculture.
Forced air fruit cooler.
Misc. Publ. U.S. Dep. Agric. **805**, 1959, p. 1, illus.

A note on an insulated cooler, which cools 250 bushels by forced draught through an ice bunker; working drawings are available.

4740. Smith, W. H., and Mann, G.
Hydrocooling.
Agriculture, Lond., 1960, **67**: 80-4, bibl. 3, illus.

Methods of hydrocooling vegetables and the rates of temperature loss in cabbages are described. Details are given of the effects of hydrocooling on the maintenance of quality in vegetables and apples.—Ditton Lab.

4741. Roach, F. A.
Effects of cold storage on fruit and vegetables.
Agriculture, Lond., 1960, **67**: 66-70.

Effects of temperature, humidity and CO_2 during and after storage, discussed briefly.

4742. Anon.
Conservazione dei prodotti ortofrutticoli. **(Storage of vegetables and fruit.)**
Frutticoltura, 1960, **22**: 273-4.

An apparatus known as "Integral" maintains constant humidity and temperature and circulates sterile air, freed from CO_2, through the storage chambers or wagons. It is available in units which may be operated singly or in series.

4743. Strackenbrock, K.-H.
Luftwäsche in Obstlagerräumen. I. Wirkung von Aromastoffen und ihre Entfernung aus Obstlagern durch Luftwäsche. **(Air scrubbing in fruit storage buildings. I. The effect of aromatic substances and their removal from fruit storage buildings by air scrubbing.)**
ErwObstb., 1960, **2**: 117-18, bibl. 7.

Including comparisons between 2 types of scrubber.

4744. Marino, A.
I frigoriferi rurali. I trasporti: semplicemente isolati o refrigerati. **(Rural cold stores. Insulated and refrigerated transport.)**
Frutticoltura, 1960, **22**: 149-51.

For transport by road. [For earlier papers see *H.A.*, 29: 2186r and 30: 1760 and 3380.]

4745. Organization for European Economic Co-operation.
Marketing of fruit and vegetables in Yugoslavia.
Publ. EPA/OEEC **7**, 1959, pp. 31, 2s. 6d.

A supplement to the report on the marketing of fruit and vegetables in Europe [see *H.A.*, 28: 2012].

4746. Gooding, E. G. B.
Report to the Government of India on the dehydration of vegetables and fruits in India.
Rep. FAO/ETAP **964**, 1958, pp. 45.

The potentialities of the industry in India and the need for research are discussed. In addition to recommendations, mainly on research, the report has useful appendices on methods and equipment.

Plant protection.

(*See also* 5841, 6097, 6280, 6283, 6284, 6291, 6298.)

4747. Bärner, J.
Bibliographie der Pflanzenschutzliteratur. 1953. **(Bibliography of plant protection literature. 1953.)**
Biol. Bundesanst. Land-u. Forstwirtsch., Berlin-Dahlem, 1960, pp. 527.

The bibliography contains over 15,000 references. The detailed list of contents, which simplifies the location of any particular subject, appears in German, English and French.

4748. Bayer, Leverkusen.
"Bayer" Pflanzenschutz Compendium. **(The Bayer compendium of plant protection.)**
Farbenfabriken Bayer A. G., Leverkusen, undated, pp. 222 + 78 colour plates + supplement of pp. 64 + 15 colour plates.

Dealing chiefly with the various Bayer products for disease, pest and weed control and with rule of thumb methods for estimating the amounts of chemicals required. There is an impressive array of coloured plates depicting pests, diseases and the injuries they cause.

4749. Weihing, J. L.
Plant diseases.
[*Publs*]. *Neb. agric. Ext. Serv.* **E.C. 59-1819** to **E.C. 59-1824** and **E.C. 59-1826** to **E.C. 59-1832,** 1959, illus.

Brief advisory notes are given on the following diseases and their control:

1819. Anthracnose of raspberry, pp. 2.
1820. Iris scorch, pp. 2.
1821. Iris leaf spot, pp. 2.
1822. Peony blight, pp. 3.
1823. Strawberry leaf diseases, pp. 3.
1824. Black spot of roses, pp. 3.
1826. Bacterial wilt of cucumber, cantelope [sic.] and watermelon, pp. 2.
1827. Mosaic diseases of pepper, pp. 2.
1828. Iris soft rot, pp. 2.
1829. Strawberry fruit rots, pp. 2.
1830. Tomato mosaic, pp. 2.

The last two publications in the series deal with:

1831. Soil treatments for damping-off, pp. 6.
1832. Facts about chemicals, pp. 7.

4750. Robinson, R. A.
Notes on Kenya agriculture. VIII: Important plant diseases.
E. Afr. agric. J., 1960, **25**: 131-46.

Tabulated notes on the symptoms and control of 300 diseases affecting deciduous, tropical and subtropical fruits, plantation crops, vegetables and other crops.

4751. Dent, R. G.
Facts about field cricket control.
J. Agric. S. Aust., 1960, **63**: 286, illus.

The addition of 8 oz. actual dieldrin to one bag of superphosphate per acre, applied in late summer or early spring, is recommended for the control of *Acheta commodus* in orchards and vegetable crops.

4752. Köhler, H.
Anwendung der Antibiotika im Pflanzenschutz, unter besonderer Berücksichtigung ihrer Aufnahme, Weiterleitung und ihres Verbleibs in der höheren Pflanze. **(The use of antibiotics in plant protection, with special reference to their absorption, translocation and distribution in higher plants.)**
Anz. Schädlingsk., 1960, **33**: 25-7, bibl. 23.

A review of recent literature.

4753. Leh, H.-O.
Die Wirkung von Streptomycin auf das Wachstum einiger Kulturpflanzen. **(The effect of streptomycin on the growth of some cultivated plants.)**
Z. PflErnähr. Düng., 1960, **88**: 129-48, bibl. 4, illus.

In experiments involving 7 different plants it was found that the response to treatment with streptomycin was determined both by the type of plant and by the concentration of the chemical in the tissue, which, in turn, depended partly on the mode of application. With peas in water culture and cucumbers in soil small amounts of streptomycin added to the medium stimulated growth and flowering, whereas higher concentrations inhibited growth or killed the plants. With sunflowers even small amounts of the antibiotic had a toxic action. Spraying cucumbers with streptomycin solutions stimulated stem elongation in proportion to the concentration used. Moreover, number and sex of the flowers were affected by the chemical. With annual asters repeated spraying with streptomycin caused Mg deficiency.—Inst. PflErnähr., Bodenchem. Bodenbiol. tech. Univ. Berlin.

4754. Leh, H.-O.
Über die Beeinflussung phytotoxischer Effekte des Streptomycins durch Magnesium-und Mangan-Ionen. **(On the effects of magnesium and manganese ions on the phytotoxic action of streptomycin.)**
Z. PflErnähr. Düng., 1960, **88**: 211-21, bibl. 17.

It is suggested that the effects of streptomycin on the metabolism of higher plants are due to the formation of a complex between the antibiotic and Mg.

4755. Goodman, R. N.
The uptake of streptomycin by intact leaves and leaf tissue as influenced by time, temperature, light and cation competition.
From abstr. in *Phytopathology*, 1959, **49**: 539.

Using excised leaves of apple, pepper, bean and coleus floated on water agar containing the biotic, it was found that doubling the exposure time doubled the uptake, that increasing the temperature increased the absorption and that light also had a favourable effect. The absorption of streptomycin by leaf-tissue homogenates of apple, peach, pepper, carnation and coleus was profoundly affected by the presence of inorganic cations. All the cations studied limited adsorption, the Ca and Mn ions being especially active.

4756. May, C., and Palmer, J. G.
Effects of asphalt-varnish-fungicide formulations on growth *in vitro* of species of fungi causing decay in trees.
Abstr. in *Phytopathology*, 1959, **49**: 545.

Formulations of asphalt varnish containing captan, dichlone, ferbam, maneb, a nickel carbamate, Phaltan, phenyl mercury nitrate, phygon, thiram and zineb were prepared, and their effect determined on radial extension *in vitro* of mycelium of 11 species of fungi. Asphalt varnish alone did not retard radial extension of colonies. Mixtures containing 0·5% captan, dichlone, ferbam, Phaltan or thiram retarded, but did not prevent, radial extension of some species, but had little or no effect on others. Mixtures containing 0·5% maneb, nickel carbamate or zineb did not retard radial extension. The mixture containing 0·25% phenyl mercury nitrate prevented radial extension of the colonies when the mixture was added 3 days before the fungi were planted on agar. The mixture containing phygon became too stiff for use as a paint.

4757. Johannes, H., and Fuchs, W. H.
Zur Ermittlung der Phytotoxizität von Pflanzenschutzmitteln. **(Assessing the phytotoxicity of plant protection chemicals.)** [English summary 8 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1960, **12**: 82-5, illus.

Estimating the phytotoxicity of copper sprays by treating bean seedlings in the laboratory.

4758. Clark, N. G., and others.
A new fungicide active against *Botrytis* spp.
Chem. Ind. Lond., 1960, No. 21, pp. 572-3, bibl. 9.

2,6-Dichloro-4-nitroaniline has given good control of grey mould of lettuce, botrytis rot of strawberry, tulip fire and botrytis on anemones and cyclamen. For grey mould control it is best applied as a preplanting dust to the soil with occasional later applications. It is not phytotoxic and acts as a preventive, being unable to eradicate the fungus once it has entered the plant.—Boots Pure Drug Co., Lenton exp. Stat., Nottingham.

4759. Somers, E.
Fungitoxicity of metal ions.
Nature, 1960, **187**: 427-8, bibl. 14.

An examination of the fungitoxicity of 22 metal cations to conidia of *Botrytis fabae* suggests that there is a common, non-specific, toxic action for most metal cations, which can be related to their strength of covalent binding to the surface ionogenic groups present outside the cell protoplast.—Long Ashton Res. Stat., Bristol.

4760. Bachmann, F.
Über die insektizide Wirkung von DDVP. (0, 0-Dimethyl-2, 2-dichlorvinylphosphat). **(On the insecticidal action of DDVP (0, 0-dimethyl-2, 2 dichlorvinylphosphate).)** [English summary 17 lines.]
Anz. Schädlingsk., 1960, **33**: 41-4, bibl. 15, illus.

The chief horticultural use of this new contact insecticide, which also has a high vapour toxicity, is in the control of insects and mites in glasshouses and store rooms.—CIBA AG., Basle.

4761. Unterstenhöfer, Z.
Lebaycid, a new insecticide of low toxicity.
Höfchen-Briefe, 1960, **13**: 44-52, bibl. 2.

The active constituent of Lebaycid is 0, 0-dimethyl-0-4(methylmercapto)-3-methylphenylthiophosphate. The new insecticide combines a wide action spectrum with low mammalian toxicity. It has also moderate acaricidal properties and is non-injurious to plants. Its action against some 20 insects, many of them fruit pests, is recorded.

4762. Fisons Pest Control Ltd.
Rogor 40: technical information.
[*Publ.*] *Fisons Pest Control Ltd., Cambridge*, 1960, pp. 28.

Information is provided on the physical and chemical properties, toxicology and residues of Rogor. Recommendations, based on results of trials in various countries, are made for pest control with Rogor 40 on numerous crops, including fruit, vegetables, plantation crops and ornamentals.

4763. Anon.
Los insecticidas y las abejas. (**Insecticides and bees.**)
Circ. Estac. exp. agropec. Cinco Saltos, **2**, 1958, p. 1

A brief review, mentioning the toxic action of most organic insecticides to bees for 48 hours after application, and that of dieldrin for 7 days.

Chemical residues and their analysis.

(*See also* 5223-5228, 5431, 5533-5535, 5714, 6072, 6073, 6299.)

4764. Gustafsson, M.
Bekämpningsmedelsrester i gröda och jord. (**Fungicide, herbicide and insecticide residues on crops and in the soil.**) [English summary 2¼ pp.]
J. roy. Swedish Acad. Agric., 1960, Suppl. 4, pp. 107, bibl. pp. 19.

A review of the literature.

4765. Kovács, A., and Falchieri, F.
Saggi di dilavamento di fungicidi in laboratorio. (**Laboratory tests on the removal of fungicides by washing.**) [English summary ¼ p.]
Ann. Sper. agrar., 1960, **14**(1), Suppl. pp. cxxv-cxxxiii, bibl. 8, illus.

TMTD, zineb, ziram and bordeaux tested on privet and cherry-laurel leaves and polythene film.

4766. Dormal, S.
Residual effects of insecticides on fruit and vegetables.
Span, 1960, **3**: 77-80, bibl. 20.

A review, including some data on the RL 50 (50% residual life period) of several common insecticides.

4767. Somers, E., and Richmond, D. V.
The determination of captan in plant extracts.
Analyst, 1960, **85**: 440-2, bibl. 5.

The method used for the determination of captan in soil, which is based on its reaction with pyridine and tetraethylammonium hydroxide to form a coloured complex, has been found to be suitable for determining captan residues on plants, since it is not susceptible to interference from plant extracts or other spray chemicals on the surface of the plant.—Long Ashton Res. Stat., Bristol.

4768. Heinisch, E.
Chemische Methoden zum Nachweis oder zur Bestimmung von Pflanzenschutzmittelrückständen auf oder in pflanzlichem Erntegut. II. DDT. (**Chemical methods for the determination and estimation of residues of chemicals used in plant protection. II. DDT.**)
NachBl. dtsch. PflSchDienst, Berlin, 1960, **14**: 1-14, bibl. 119.

A survey of the literature. [For a note of part I on extraction and separation, see *H.A.*, 30: 1571.]

Experimental and statistical techniques

(*See also* 4664, 4720, 4905, 5125, 5167, 5190, 5778, 5779, 6097, 6249.)

4769. Sventickij, I. I.
The evaluation of optical radiation in the growth of plants. [Russian, with English, German and French summaries ¼ p. each.]
Vestn. seljsk. Nauki, 1960, **5**(2): 106-12, bibl. 26.

Existing methods of measuring incident radiation are criticized as they take no account of the wavelengths required for photosynthesis. Studies of the absorption spectra of plastic pigments have enabled an absorption spectrum for an "average leaf" to be determined. It is proposed that a special system of photometric values based on the spectral sensitivity of the "average leaf" should be established.

4770. Žák, J., and Kloušek, J.
Příspěvek k metodikám získávání kořenových sekretů sterilně pěstovaných rostlin. (**A contribution to the method of extracting root secretions from plants grown in sterile culture.**) [Russian and German summaries ½ p. each.]
Sborn čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 1337-46, bibl. 8, illus.

Pea plants were grown under sterile conditions, using apparatus which is here described, and the effect of β-indolylacetic acid on the composition of the root sap was determined by paper chromatography. Only quantitative differences were found between the contents of treated and untreated plants.

4771. Ducet, G., Rosenberg, A. J., and Vandewalle, G.
Phosphorylation oxydative par les mitochondries de feuilles et de racines. I. Mitochondries de feuilles. **(Oxidative phosphorylation by the mitochondria of leaves and roots. I. Leaf mitochondria.**
Ann. Physiol. vég., 1959, **1**: 209-22, bibl. 12.

A fraction, of which the activity in relation to oxidation and incorporation of mineral P is similar to that of mitochondria in animal tissue, can be separated from leaves by grinding and fractional distillation. In tomato, tobacco and spinach this fraction had no activity when the grinding medium contained only 0·005 M versene. When vacuum filtration was applied and the versene concentration was increased the fraction was very active. It was necessary to remove the sticky substance covering adult tobacco leaves before activity was obtained.—Stat. cent. Physiol. vég., Versailles.

4772. Bould, C., Bradfield, E. G., and Clarke, G. M.
Leaf analysis as a guide to the nutrition of fruit crops. I. General principles, sampling techniques and analytical methods.
J. Sci. Food Agric., 1960, **11**: 229-42, bibl. 48.

Methods of leaf sampling, including a statistical analysis of the method used at the Long Ashton Research Station, are described. With this method the overall sampling error, expressed as the coefficient of variation, is of the order of 6%, of which 1·2% occurs at the analytical stage. No significant reduction in sampling error was obtained by grinding the whole of the batch sample and taking samples direct for chemical analysis. Samples should be taken without the petiole attached if sub-samples are to be used for analysis. Analytical methods are given for determining the total N, P, K, Ca and Mg in leaf dry matter.

4773. Petrov-Spiridonov, A. E.
A polarographic method of determining calcium in solutions and vegetable tissues. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1960, No. 1, pp. 236-8, bibl. 1.

4774. Scharrer, K., and Schaumlöffel, E.
Die Bestimmung kleinster Mengen Kupfer als Cu-Diäthyldithiocarbaminat durch Verdrängungsreaktion. **(The determination of very small traces of copper as Cu-diethyldithiocarbaminate by means of the replacement reaction.)**
Z. PflErnähr. Düng., 1959, **87**: 1-15, bibl. 18.

In biological material.

4775. Scharrer, K., Russ, E., and Mengel, K.
Über die Bestimmung des pflanzenaufnehmbaren Kupfers und Mangans. **(On the determination of available copper and manganese.)**
Z. PflErnähr. Düng., 1959, **85**: 1-20, bibl. 20.

4776. Pienaar, W. J.
A direct reading spectrochemical method for the analysis of plant material. [Afrikaans and French summaries ¼ p. each.]
S. Afr. J. agric. Sci., 1960, **3**: 57-68, bibl. 15, illus.

For Mg, Mn and Cu, using direct current arc excitation and photomultiplier tubes.

4777. Scharrer, K., and Höfner, W.
Kationenabtrennung durch Ionenaustauscher bei der photometrischen Molybdän-Bestimmung mit Dithiol. **(The separation of cations by ion exchangers in the photometric determination of molybdenum with dithiol.)**
Z. PflErnähr. Düng., 1959, **85**: 49-56, bibl. 9.

For the determination of trace amounts of Mo in plants, soils, etc.

4778. Harberts, C. L., and Thijsen, G.
Die Nitratbestimmung in Pflanzensubstanz. **(The determination of nitrate in plant substances.)** [English and French summaries 7 lines each.]
Landw. Forsch., 1960, **13**: 128-34, bibl. 5.

4779. Balks, R., and Reekers, I.
Nitratbestimmung in Pflanzensubstanz mit 1,2,4-Xylenol. **(Nitrate determination in plant substances with 1,2,4-xylenol.)** [English and French summaries 10 lines each.]
Landw. Forsch., 1960, **13**: 134-6, bibl. 5.

4780. Muromcev, G. S., and Nestjuk, M. N.
Quantitative colorimetric determination of gibberellic acid. [Russian.]
Vestn. seljsk. Nauki, 1960, **5**(2): 119-22, bibl. 6.

A quick and reliable method, in which the colour developed with a tungsten-molybdenum reagent in acid solution is measured with a photoelectric colorimeter.

4781. Sprent, P.
Analysis of small experiments.
Nature, 1960, **187**: 437-8, bibl. 1.

Three situations are considered in which quantitative inferences based on the results of single small experiments may be misleading.—E. Malling Res. Stat., Kent.

Practical and research equipment.

(*See also* 4657, 4669, 4688, 4689, 4739, 4742, 4943, 4944, 5238, 5849, 5943, 5996-5998, 6038, 6218, 6269.)

4782. Loewel, E. L., and Mauch, A.
Eine Vorführung schlepperangetriebener Bodenbearbeitungsgeräte für den Obstbau. (**A demonstration of tractor-driven implements for soil cultivation in orchards.**)
Mitt. ObstVersuchsringes Jork, 1960, **15**: 125-31, illus.

Illustrated notes on 8 German and Danish implements.

4783. Richardson, D. A.
Subsoiler digs out old fruit trees.
N.Z.J. Agric., 1960, **100**: 379, illus.

To clear an orchard of 49-year-old trees a grower reversed the tool-bar carrying 2 subsoiler shoes on his crawler tractor. The subsoiler shoes, set 20 in. apart and operated like a bulldozer, were able to remove trees at a rate exceeding two a minute. Only a small amount of soil was removed with the trees.

4784. Anon.
Sloten baggeren langs fruittuinen. (**Dredging ditches round orchards.**)
Fruitteelt, 1959, **49**: 1207, illus.

A small floating machine for dredging narrow ditches.

4785. Hansen, C. M., and Hedden, S. L.
Development of a fruit tree hedger.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 527-33, illus.

A machine is described and illustrated, which will operate horizontally or vertically and will cut through limbs up to 1¾ in. in diameter. The cutter bar height and speed may be readily controlled by the tractor driver when travelling at a speed of 2 m.p.h. The machine has given satisfactory results when tested in apple and peach orchards.

4786. Funikov, A. V.
Trials on the spraying and dusting of orchards and vineyards with helicopters. [Russian.]
Sadovodstvo, 1960, No. 4. pp. 29-31, illus.

Comparisons were made between spraying with tractors, an aeroplane and 2 types of helicopter driven at 25-35 and 50-60 k.p.h. at a height of 5 m. on level ground and at 10 m. on slopes. Examples are given of very good pest and disease control by helicopter application.

4787. British Columbia Department of Agriculture, Agricultural Engineering Division.
Tractor power take-off sprayers.
Bull. B. C. Dep. Agric. **A.E.8**, 1959, pp. 31, illus.

Basic considerations are set out for the grower who wishes either to assemble his own sprayer or to purchase one complete. Topics covered include pumps, booms, nozzles, calibration of sprayers, care and maintenance and safety precautions. A list of firms manufacturing equipment and accessories is included.

4788. Giuliani, L.
Nuovi apparecchi atomizzatori-polverizzatori. (**New equipment for spraying and dusting.**)
Frutticoltura, 1960, **22**: 186-8, illus.

The tractor-mounted "Universal" apparatus produces a mist spray and can also be adapted for dusting. Its action can be controlled in 5 different ways to suit various heights and spacings of fruit trees, bushes, vines or vegetables. It is obtainable in 3 models, of 12, 18 or 30 H.P. Another unit the AS1 (Schefenacker), which is portable, can be used as a sprayer, as a duster for dry or moistened powders, or as a flame thrower. It is powered by a 3-H.P. motor.

4789. Čekalov, A. I.
The efficiency of orchard sprayers. [Russian.]
Vestn. seljsk. Nauki, 1960, **5**(3): 133-5.

Four high-volume, power spraying machines compared.

4790. Sardarjan, R. A.
A sprayer for hilly orchards. [Russian.]
Sadovodstvo, 1960, No. 3, pp. 28-9, illus.

A light, horse-drawn, 2-wheeled sprayer with independent wheel alignment, for use across steep slopes.

4791. Machado Llamozas, G., and González Rincón, H.
Método práctico para calibrar asperjadoras. (**A practical method for calibrating spraying equipment.**)
Serv. Shell Agric., Cagua, Ser. B, **3**, 1959, pp. 29, illus.

The calibrator is a graduated plastic bag, for use with nozzles 40 or 50 cm. apart on a tractor-drawn or knapsack apparatus. It collects the liquid emerging from a single nozzle over a trial distance of 50 m., and converts this quantity into litres per hectare. Its use with both types of apparatus is described in detail.

4792. Ostazeski, S. A.
A small-lot seed scarifier powered by an electric drill.
Agron. J., 1960, **52**: 365-6, illus.

An illustrated account, giving the construction and operation of a scarifier, which has markedly increased germination of lupin and crotalaria seeds.

4793. Webber, R.
Two hands can cope with 600 pots an hour.
Grower, 1960, **54**: 174-5, illus.

A note on the P.H.D. mobile potting unit, which has speeded up the potting of saintpaulia plants at

P. H. Dodgson (H.M.) Ltd., Woodgreen, Fordingbridge, from 110 to 600 plants per worker per hour.

4794. (MARTIN, H. H.)
Heat blast warms orchard.
Western Fruit Gr, 1960, **14**(3): 45, illus.
A tractor-drawn orchard heater mounted on skids, which provides instant heat for up to 2 acres and runs for 6 hours without refueling.

4795. MINSHALL, W. H.
Air conditioned phytotron rooms.
Reprint from *Air Engng*, November, 1959, pp. 4, illus.
Constructional details are given of the growth rooms at the Pesticide Research Institute, London, Ontario, Canada.

4796. ANDREEV, S. V., AND OTHERS.
The phytotron—a controlled climate apparatus for conducting scientific experiments. [Russian.]
Vestn. seljsk. Nauki, 1960, **5**(3): 129-33, illus.
The construction and mode of operation of a chamber, which has a floor area of 6 sq. m., are described and illustrated.

4797. MARSHALL, R.
Electrical aids to horticulture.
Agriculture, Lond., 1960, **67**: 114-18.
Developments in greenhouse bench warming and control of night temperatures in N.W. England.

4798. WHITAKER, J. H., AND WAXMAN, S.
Light-operated interval switch.
Ill. St. Flor. Ass. Bull., 1960, No. 203, pp. 8-9, illus.
The principle of operation, construction and calibration of the switch, which operates electronically through a phototube and a gas discharge tube, are described. It may be used to control automatically the application of irrigation water or mist sprays in propagation systems.—Univ. Conn., Storrs.

4799. CANHAM, A. E.
Supplementing winter daylight.
Gdnrs' Chron., 1959, **146**: 331, 340, illus.
Economic and practical considerations on the choice of lamps for supplementary illumination of seedlings.

4800. LOS, G. J.
De lichtafhankelijke temperatuurregelaar. **(A light-controlled temperature regulator.)**
Meded. Dir. Tuinb., 1960, **23**: 240-1, illus.
For use in the glasshouse, but not yet fully tested.

4801. COOPER, D. J., AND OTHERS.
Note on an apparatus for controlling soil temperatures.
Canad. J. Soil Sci., 1960, **40**: 105-7, bibl. 1, illus.
Large water baths fitted with immersion-type heaters or refrigeration coils.

4802. MARAIS, P. G., AND SMIT, W. B. de V.
Neutron moisture meter—circuit diagram and operation. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1960, **3**: 115-30, bibl. 19, illus.
Developed for measuring soil moisture at W. Prov. Fruit Res. Stat., Stellenbosch.

4803. BRAINES, L. N., AND ISTOMINA-TSVETKOVA, K. P.
The use of reflectors of ultraviolet radiation from the sun for attracting bees to required areas of crops. [Russian.]
Bjull. nauch.-tekh. Inf. Inst. Pchelovodstva, 1956, No. 1, pp. 23-6, from abstr. in *Bee World*, 1959, **40**: 320-1.
Experiments on the use of polished aluminium and white and black paper, with and without ultraviolet filters, showed that the aluminium screens reflected the most ultraviolet light and were the most attractive to bees.—Beekeeping Res. Inst., Rybroe, Ryazan Prov., U.S.S.R.

Greenhouses, frames and cloches.

(*See also* 4656, 4797, 4800, 5558, 5795, 6296.)

4804. VAN DEN MUIJZENBERG, E. W. B.
Klimaatbeheersing in kassen. **(Climate control in glasshouses.)** [English summary 14 lines.]
Meded. Dir. Tuinb., 1960, **23**: 159-64, illus.
The effect of glasshouse structure and materials on the climate in the house and the possibility of controlling light, temperature, humidity and CO_2 content are discussed.

4805. GERMING, G. H., AND OTHERS.
Kassenbouw in Zwitserland. **(Glasshouse construction in Switzerland.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1960, **23**: 79-86, bibl. 1, illus.
A survey, with special reference to systems for automatic control of glasshouse climate.

4806. LOS, G. J.
Temperatuur en licht in onverwarmde kassen van verschillend type. **(Temperature and light in different types of unheated glasshouse.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1960, **23**: 242-8.
Light and temperature measurements were made from November to April in wide-span galvanized iron glasshouses and in a wooden Venlo-type house of the same size. Higher light intensity, higher soil temperatures and more even air temperatures were recorded in the galvanized iron houses, the differences being greatest on sunny days.—Inst. Tuinbouwtech., Wageningen.

4807. Whittle, R. M., and Lawrence, W. J. C. **The climatology of glasshouses. III. Air temperature.** [French and German summaries 15 lines each.]
J. agric. Engng Res., 1960, **5**: 165-78, bibl. 4, illus.

Air temperatures in glasshouses differing in glazing and orientation, and with and without tomato crops, were measured during a period of 5 years. Horizontal and vertical gradients in unheated and unventilated houses were small or absent; in heated houses gradients, when they occurred, were determined by the position and numbers of the heating pipes. Winter temperatures were consistently higher in an unheated and unventilated east-west house than in a north-south house. The use of automatic roof ventilators reduced temperature fluctuations and, in summer heat, also reduced the mean excess temperature to 6–7° F. [Author's abstract.—For part II, see *H.A.*, 30: 3214].

4808. Durkin, D., and Kiplinger, D. C. **Washed-air cooling on plants results in 30% more leaf food.**
Flor. Exch., 1960, **134**(11): 17, 51.

The leaf temperature of roses, chrysanthemums, carnations and poinsettias was measured by means of thermocouples in an air cooled greenhouse and also in a greenhouse of the same size, but ventilated by ridge and side vents. Leaf temperatures of plants in the air-cooled greenhouse were, on average, 7° F. less than with normal ventilation. The effect of cooling on food manufacture was demonstrated by removing 1 or a pair of rose leaflets at 7 a.m. and by removing the remaining leaflets at 7 p.m. The difference in weight after drying was an indication of the amount of food manufactured, and results showed an increase of 30% in the food accumulated in the leaves with air cooling. The water loss from plants in the non-cooled greenhouse was 15–40% higher than in the air-cooled greenhouse. Production of roses from July to September showed a reduction of 10% with cooling, but there was a marked improvement in flower and foliage colour and size. [See also *H.A.*, 30: 4241.]

4809. Anon.
Greenhouse heat saving with polythene.
Parks, 1960, **25**: 286-8.

During a 7-week trial half a greenhouse was lined with BCL clear polythene film, 150 gauge, and sealed off, and the other half was used as a control. Continuous readings of maximum and minimum temperatures and humidity were taken in both halves and outside, and it was found that the average daily temperature in the lined half varied by only 12·54° F., whereas in the unlined half and outside it varied by 17·5° F. and 18·2° F., respectively. An average saving of 32% in heating costs was obtained by lining, but it is estimated that in larger houses the saving would be only 16–23%

4810. Nisen, A.
Quelques résultats culturaux obtenus sous polyesters stratifiés. **(Some cultural results obtained under stratified polyesters.)**
Bull. Inst. agron. Gembloux, 1960, **28**: 47-80, illus.

Polyester film was compared with glass as a greenhouse material in trials with ornamental bulbs and vegetables. The latter included lettuces, radishes, parsley, leeks and tomatoes. It is concluded that the value of polyester varies with the crop, the season, the soil and climatic conditions. Satisfactory results were obtained with Tuckwood tomatoes, for example; yields were the same as under glass, the weight per fruit being greater under film but the number of fruits less.

4811. Emmert, E. M.
New look in field greenhouses.
Amer. Veg. Gr, 1960, **8**(2): 17, 59, illus.

Consisting of polythene covers on wooden frames, these field houses are cheap to build and production costs are low. The plastic is replaced each year, but the frames will last 4–5 years if properly protected against rots.

4812. Casini, E.
Serra smontabile con copertura di polietilene. **(A polythene-covered greenhouse that can be dismantled.)**
Frutticoltura, 1960, **22**: 263-6, illus.

Measurements, cost and constructional details are given.

4813. Brandenburg, W., and Challenger, S.
Plastics for greenhouses and frame covers.
N.Z. comm. Gr, 1960, **15**(10): 12-13.

Features of various materials, constructional details and costs briefly discussed, with notes on experience with several crops.

4814. d'Ersu, —., and Martineau, —.
L'utilisation des films plastiques faite jusqn'à ce jour dans la zone maraîchère nantaise. **(The use of plastic films in the Nantes market-garden zone.)**
Rev. hort. Paris, 1960, **132**: 2204-6, illus.

Films ranging from 0·03 to 0·2 mm. in thickness have been tested in portable panels for laying on frames, in cloches and in greenhouses, with and instead of glass, and also for mulching (black film). The experimental crops include carrots, cucumbers, lettuce (encourages *Bremia*), turnips and radishes (successful for both), and tomatoes (unsuccessful except as mulch).

4815. Brun, R., and du Quaillard, H.
Essais de semi-forçage sur melons. Utilisation de différents abris en matière plastique. **(Forcing trials on melons. The use of different plastic-covered cloches.)**
Rev. hort. Paris, 1960, **132**: 2196-200, illus.

Unreplicated trials with polyvinyl chloride (PVC) and polythene (PE) plastic used in different types of walled and wall-less cloches revealed no clear-cut differences in yields but indicated that (1) cloches allowing the greatest air supply were the best, (2) good aeration appeared to play an important role in fruit setting, and (3) there was no marked difference between PVC and PE. Cropping started 3 days earlier under glass than under plastic.

4816. Le Gloru, P., and Cano, —.
Quelques aspects de l'utilisation des films plastiques pour les cultures hâtées dans le Midi de la France. (**Some aspects of the use of plastic films for early crops in the south of France.**)
Rev. hort. Paris, 1960, **132**: 2192-5, illus.

Experiments with polyvinyl chloride (PVC) and polythene (PE) films used to protect melons, asparagus and spring lettuce gave inconclusive results. Results with Surprise des Halles strawberries were promising. Yields under film laid on hoops were only slightly lower than in the uncovered controls, namely, 35·8 kg. compared with 36·0 kg. per 50 sq. m. The first significant pickings, 1·4–1·55 kg., were obtained on 24 April with film and on 11 May in the control. PVC gave slightly earlier yields than PE. These sold for 16,795 old francs compared with 15,875 and 6,600 with PE and control, respectively. The plastic cloches gave extra returns of 3925–4395 old francs [approx. £3] per 25 sq. m.

4817. Bellet, —.
Résultats techniques et économiques pour certaines cultures hâtées sous plastiques (asperges, fraises, melons, tomates). (**Technical and economic results with certain early crops under plastics (asparagus, strawberries, melons, tomatoes).**)
Rev. hort. Paris, 1960, **132**: 2201-3, illus.

Notes are given on preliminary trials in Bas-Rhône-Languedoc. With melons sowing was possible 12 days earlier (3 April) under plastic than in the open; polythene (PE) 0·03 mm. thick showed a profit compared with unprotected plants, but PE 0·15 mm. thick and polyvinyl chloride (PVC) 0·15 mm. thick showed a loss. With asparagus earthing-up plus translucent plastic was superior to earthing-up plus black plastic. Strawberry harvesting began on 24 and 29 April with 1-year-old and current-year plants respectively under PE compared with 10 May in the control, and ended on 24 and 28 May compared with 5 June. With 3 table tomato varieties the yield results with 0·15 PVC and 0·15 PE were inconclusive. With Marmande, the highest-yielding of the 3 varieties, the May, June, July and total cash returns with PVC were all higher than those obtained with glass, but only the June and total cash returns were higher with PE than with glass.

4818. Kulesza, J.
O sposobach usuwania i przeciwdziałania nalotom z dymów przemysłowych na szklarniach i inspektach w górnośląskim okręgu przemysłowym. (**On methods of removing and counteracting industrial smoke films on the surface of hothouses and hotbeds in the Upper Silesian industrial area.**) [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 327-32, bibl. 8.

A preparation which removed the smoke film without harming the glass consisted of a mixture of sulphuric, hydrochloric and hydrofluoric acids (up to 10%) absorbed on granulated coke dust, saturated with a non-ionized wetting agent. It is applied as a paste at the rate of 30-40 g./sq. m. to the glass, which is then washed with a stream of water.

TEMPERATE TREE FRUITS.

General.

(*See also* 6280, 6301, 6302, 6315, 6320, 6325, 6327, 6329, 6331.)

4819. Comité National pour l'Étude de la Culture Fruitière, I.R.S.I.A.
Rapport Succinct, Comité National pour l'Étude de la Culture Fruitière, déc.1958-déc. 1959.
(**Short Report of the [Belgian] National Committee for the Study of Fruit Growing, Dec. 1958 - Dec. 1959**), pp. 92. [In French and Flemish.]

Yields of Durondeau pears were slightly higher on clean cultivated plots and grass plots mown 4 times than on those mown 5 or 7 times during the season. This variety and Bonne Louise d'Avranches showed no significant yield differences under clean cultivation and sods of *Poa* and white clover or *Agrostis*, but the mixed sod caused more vigorous tree growth. A straw mulch gave slightly better results than bare soil in this very dry season. For the apple varieties Winter Banana, Cox's Orange Pippin and Belle de Boskoop clean cultivation was better than a permanent grass cover. Fruit weight of both apples and pears was greater on bare than on grassed plots, but for apples grassing produced better colouring. Of 10 different mixed swards those producing the greatest amounts of green manure were timothy + red fescue + white clover, perennial ryegrass + red fescue + white and hybrid clovers, and *Poa pratense* + white clover, the last needing the shortest time to decompose. In a 5-year fertilizer experiment with

3 pear varieties an annual application of NPK at 150:120:300 units [kg. ?] per ha. gave greater yields than lighter applications with the same ratio, but there were indications that for Clapp's Favourite and Triomphe de Vienne biennial application might be better than annual. The effects of applying the minimum of each of the elements N, S, P, K, Ca and Mg on flower production, fruit set, fruit drop and leaf composition of apple trees are tabulated. Leaf cuttings of 8 apple varieties failed to root in spite of treatment with IBA and the maintenance of a moist atmosphere. The effects of various nutrient solutions on the growth and composition of *Tradescantia* plants are tabulated, showing that Mg is relatively unimportant, K is in high demand, the N optimum is between 50 and 100 p.p.m., and P must be kept low. This plant may possibly serve as a K indicator in testing orchards soils. Chlorosis of pear trees deficient in Fe, and more particularly in Mn, was most effectively remedied by injecting powdered Fe and Mn salts into the trunks. Spraying was only temporarily successful. The failure of soil-applied chelating agents was possibly due to abnormal weather. Increases of leaf Fe were greater and more variable in the spring than later in the growing season, and leaf Mn tended to decrease as Fe accumulated. Necrotic leaves had outstandingly high Fe contents, and the critical level in the controls appeared to be about 100 p.p.m. (dry matter). Data on the relationship of tree age to trunk girth have been statistically analysed for Cox's Orange Pippin on M.IX and M.II in numerous localities, showing 2 types of growth in the former and 3 in the latter combination, owing partly to differences in soil and more markedly to differences in cultural practices. A method of recording the results of pruning experiments on punched cards is described. Apple fruit thinning with 20 p.p.m. NAA in 2 localities was effective and harmless when carried out in the evening, the optimal temperature being 14–16° C. Midday treatment checked vegetative growth.

4820. NOVA SCOTIA.
Ninety-sixth Annual Report of the Nova Scotia Fruit Growers' Association. Proceedings of the Convention held at Kentville, Nova Scotia, November 30th, December 1st, 2nd, 3rd, 1959, pp. 154.

Items discussed include: The 1959 sample census of apple orchards in the Annapolis Valley; the physiology of fruit set; some principles of apple production; arsenical spray deposits on the fruit and foliage of apple trees (on McIntosh and later varieties arsenic residues on mature fruit should seldom if ever be a problem, provided the second of two arsenical sprays is applied before July 15); modified atmosphere packages for fruit; apple fungicide tests in 1959; pollination studies on apples.

4821. VASIL'EV, A. E.
The size and profitableness of state fruit farms. [Russian.]
Sadovodstvo, 1960, No. 1, pp. 19-21, bibl. 3.

In a survey of 56 Russian fruit farms divided by size into 4 groups the group consisting of the largest farms, all over 1,000 ha., showed the highest yields of pome, stone and soft fruits per ha. with the lowest production costs. Factors contributing to the efficiency of these large farms included mechanization, organization of work and skilled personnel.

4822. FOLLEY, R. R. W., AND YATES, K. C.
Economics of fruit farming, Report No. 5. Investment in orchards.
Rep. Dep. agric. Econ., Wye Coll., 1960, pp. 58, bibl. 2, illus., 5s.

The economics of establishing apple and pear orchards at different spacings, with or without intercrops or filler trees, are discussed. The evidence suggests that growers can use filler trees to advantage, especially if they are pruned differently from the permanent trees. Close planting with early maturing fillers is recommended. The best time to grub the filler trees has not yet been decided.

4823. PERKINS, F. A.
Organization and management of 42 Maine commercial apple farms.
Bull. Me agric. Exp. Stat. **589**, 1960, pp. 34, bibl. 5, illus.

An economic study of acreages, production, costs and returns.

4824. KIMURA, J., SHIBUKAWA, J., AND FUKUSHIMA, S.
The apple industry of Aomori.
Admin. Ser. Aomori Prefectural Govt, Nagashima, **72**, 1959, pp. 35, illus.

This booklet begins by describing the development of the Japanese apple industry in general, and gives short descriptions of the types of apple grown. The remaining pages deal with the Aomori apple industry, the topics covered including climate, varieties, soil management, fruit thinning, harvesting, pests and diseases including control, labour requirements and marketing.

4825. KEMMER, E., AND SCHULZ, F.
Zur Frage der Ertragsbeurteilung beim Apfel. **(On the question of evaluating yields.)**
ErwObstb., 1960, **2**: 133-6.

Definitions of the terms "bad year", "biennial bearing" and "equalization of yields" by (planting more trees, possibly with a different rhythm).

4826. MOUNT, W. E.
Canning fruit varieties.
J. Agric. S. Aust., 1960, **63**: 360-3.

A survey of peach, apricot and pear acreages and production in the Murray Irrigation Areas.

4827. HIGGS, A. L.
The decline of the apricot acreage in Tasmania.
Tasm. J. Agric., 1960, **31**: 45-57, bibl. 5, illus.
Poor cultural practices, die-back (*Eutypa*) and brown rot (*Sclerotinia*) are considered to be the main causes of declining production. Control measures for both diseases are given, and a method of pruning developed in South Australia is described, which might aid die-back control as well as improve tree vigour and yields.

4828. COMAN, S., AND CONSTANTINESCU, N.
Agrotehnica prunului în Antestepă. (**Complex cultural practices for plum growing in the Antesteppe region.**) [English, French, Russian and German summaries ½ p. each.]
Grăd. Via Liv., 1959, **8**(11): 39-41.
A comparison of different combinations of treatments, involving frequency of cultivation, fertilizer rates and pruning severity.

4829. GOSSELIN, H.
Le figuier commun (*Ficus carica* L.). (**The common fig.**)
Rev. hort. Algér, 1959, **63**: 19-22
The subjects discussed include distribution in France; soils; propagation by hardwood cuttings 40-50 cm. long, preferably from straight 2-year-old branches, planted with ¾ of their length underground in autumn or February/March and transplanted after a year; pruning by shortening the framework branches, removing water-sprouts and keeping the centre open; summer- and autumn-yielding varieties; pests and diseases.

Breeding and varieties.

(*See also* 6318.)

4830. POTTER, J. M. S.
The national fruit trials.
J. roy hort. Soc., 1960, **85**: 174-84, illus.
Siting and arrangement of the preliminary and main trials of top and soft fruit.

4831. TOMCSÁNYI, P.
Közvetett vizsgálati módszerek alkalmazása a gyümölcsfak fajtaérték bírálatára. (**The use of indirect methods for testing fruit tree varieties.**) [Russian and German summaries 3 pp. each.]
Kisérl. Közlem., Sect. C, 1958 (issued 1959), **51C**(3): 5-29, bibl. 21.
See *H.A.*, 30:3237.

4832. OKANAGAN AGRICULTURAL CLUB, FRUIT VARIETIES COMMITTEE.
Fruit varieties, rootstocks and frameworks recommended for commercial planting in southern interior of B.C. for 1960.
B.C. F.G.A. quart. Rep., 1959, **4**(3): 14-20.
Apple, apricot, cherry, peach, pear and prune varieties and apple rootstocks.

4833. URE, C. R.
Breeding hardy apples for Prairie Canada.
Agric. Inst. Rev., 1960, **15**(1): 20-2, 54-5, illus.
A review.

4834. LAUBSCHER, F. X., AND HURTER, N.
The chromosome numbers of seedling progeny from triploid apples. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1960, **3**: 31-9, bibl. 15.
Chromosome counts on cells in the root tips of 884 seedlings of triploid varieties showed a bimodal distribution with peaks at 41 and 44 chromosomes per cell, which does not agree with a basic number of 7 for the apple. Although the frequency of tetraploids from triploid × diploid crosses is very low, they are considered to be better breeding stock than those obtained by the colchicine treatment of diploids.—Univ. Stellenbosch.

4835. POPOV, B. A.
An interesting hybrid apple. [Russian.]
Agrobiologija, 1960, No. 1, pp. 147-8.
The "hybrid" is a seedling of an old tree of Doucin III fertilized by pollen from the first flowers of a young tree of Doucin III. The "hybrid" produces sphaeroblasts freely, which contain root initials, thus facilitating vegetative propagation.

4836. CHAMBERLAIN, E. E., ATKINSON, J. D., AND HUNTER, J. A.
Striped cracking in Kidd's Orange Red apples.
Orchard. N.Z., 1960, **33**: 72-3, bibl. 1, illus.
Symptoms affecting both fruit and wood are described; these are not transmissible and are thought to be due to a mutation. Affected branches should be cut out and replaced with normal scions of the same variety.

4837. SCHAAP, A. A.
Enkele ervaringen met twee rode mutanten. (**Some experiences with two red sports.**)
Fruitteelt, 1960, **50**: 747, illus.
Double Red Wealthy is considered to be an improvement on Wealthy, but Karin Schneider is not so acceptable as its parent Ingrid Marie.

4838. MARRO, M., AND COBIANCHI, D.
Caratteri differenziali nella Richared, Stark Delicious e Starking. (**Distinguishing features of the apple varieties Richared, Stark Delicious and Starking.**)
Progr. agric., 1960, **6**: 321-5, illus.
Delicious is considered to be identical with Stark Delicious. The main feature distinguishing Starking is its early coloration, beginning when the fruit is very small. Fruit size, shape and colouring are described for the 3 varieties. A recent bud mutation in Richared produced a striation of colour in the fruit skin, whereas previous mutations in this group have been similar to the parent in colour distribution or have been less streaked than the par-

ent. Stark Delicious has produced fairly frequent chimaeras with a sector of Richared skin.

4839. SCHAAP, A. A.
Ervaringen met nieuwe appelrassen. III en IV. **(Experience with new apple varieties. III and IV.)**
Fruitteelt, 1960, **50**: 335-7, illus., and 432-5, illus.

Observations on the behaviour and quality of 6 mid-season and 9 late varieties. [For parts I and II on early varieties, see *H.A.*, 30: 1623.]

4840. LOBANOV, G. A.
Growth characteristics of hybrid pear seedlings. [Russian.]
Agrobiologija, 1960, No. 1, pp. 71-4, illus.

Seedlings of one hybrid family could be divided into 4 types: those which developed cultivated (i.e. mature) characteristics without passing through a noticeable wild (i.e. juvenile) stage, those showing a gradual transition from wild to cultivated characteristics, those showing an abrupt transition to cultivated characteristics, and those in which the mature stage never develops in any region of the crown. The author discusses the extent to which vegetative characters such as shoot size, bud shape, crotch angle, and leaf shape may be indicative of fruit quality.

4841. JOVANČEVIĆ, R., AND ČARDAKLIJA, Č.
Domaće sorte krušaka u Gornjem Polimlju. **(Indigenous pear varieties in Gornje Polimlje.)** [English summary ½ p.]
Arch. poljopr. Nauk., 1959, **12**(38): 126-45, bibl. 8, illus.

A description of 15 Yugoslav varieties, with special reference to fruit quality and utilization.

4842. VAN DEN BERGE, C.
Aantekeningen bij de aanplant van Doyenné du Comice. **(Notes on the growing of Doyenné du Comice.)**
Fruitteelt, 1959, **49**: 1178-9, illus.

In the last ten years there has been a striking increase in the yields per unit area of Doyenné du Comice in Holland. The author discusses various factors that appear to affect the productivity of this variety, including pollination, shelter, training, phytotoxicity of spray materials, choice of graft wood and urea sprays.

4843. MANZO, P.
La nuova cultivar di pera, Butirra di Roma. **(Butirra di Roma, a new pear variety.)**
Frutticoltura, 1960, **22**: 271-2, illus.

A description of this seedling of Butirra (Beurré) Clairgeau × Williams'.

4844. SQUILLACI, A.
Le cultivar di nespolo del Giappone da diffondere nella Sicilia orientale. **(Varieties of loquat suitable for growing in eastern Sicily.)**
Tec. agric., 1959, **11**: 220-42, illus.

Loquats can be profitably grown among citrus or other fruit trees if the varieties are carefully chosen. Those recommended for the area are Pizzuta, Zuccherina, Tipo zuccherina, Palermitana, Bufuluta, Rainara, Tonda a rappu and Nespolone. Each is described and general information is given on loquat cultivation.

4845. FAIR, E. W.
Improved apricot varieties.
Amer. Fruit Gr, 1960, **80**(3): 50.

Utah 18, Utah 27 and Utah 32.

4846. (FOGLE, H. W.)
Better cherries for the Northwest.
Agric. Res. Wash., 1960, **8**(8): 11.

Cherry seedling selections are described, from which it is hoped to introduce improved varieties. Dark fruited selections are being developed which ripen successively through several weeks, thus extending the harvest season to 5 instead of the usual 3 weeks.

4847. ANON.
New peach varieties.
Orchard. N.Z., 1960, **33**: 81-2.

Brief descriptions and dates of full bloom and peak maturity of 5 American and Canadian varieties.

4848. HINRICHS, H. A.
Goldenred peach.
Bull. Okla. St. Univ. Exp. Stat. **B-542,** 1960, pp. 7, illus.

A new yellow freestone, resistant to bacterial spot, resulting from a cross between Early Elberta and Halehaven [see also *H.A.*, 30:152].

4849. SCHNEIDER, G. W., CLAYTON, C. N., AND CORRELL, F. E.
Marcus new peach is early.
Res. and Fmg N.C., 1959, **18**(2): 10.

A yellow fleshed variety ripening 2–3 days before Mayflower and 10 days before Cardinal.

Propagation and rootstocks.

(*See also* 4677, 4819, 4832, 4869, 4876, 4879, 4898, 4918, 6279.)

4850. HUGARD, J.
Le porte-greffe en arboriculture fruitière. **(Rootstocks in fruit growing.)**
Progr. agric. vitic., 1960, **153**: 314-18, 343-7.

A general article, dealing with vigour, soil requirements and the comparative merits of seedling and clonal rootstocks.

4851. KIRKOPULO, E. N.
Coal ash as a stratifying material for fruit seeds. [Russian.]
Tr. Odessk.s.-h. In-ta, 1957, **8**: 93-6, from *Ref. Ž. (Biol.)*, 1958, No. 21, Abstr. 96,115.

Seeds of wild apple and pear were stratified in wood ash, sieved fresh coal ash, river sand or composted pine sawdust at 0–7° C. Stratification in coal ash resulted in a higher percentage of germination, more uniform emergence and more vigorous seedling growth than stratification in the other materials.

4852. Kuznecov, M. D., and Zakotin, V. S.
Raising rootstocks without pricking out. [Russian.]
Sadovodstvo, 1960, No. 4, pp. 20-2, illus.

To produce seedling rootstocks with well developed fibrous root systems the seedlings normally have to be pricked out at an early age. When, however, apple and pear seeds were soaked in heteroauxin at 50 mg./l. for 12 hours or at 100 mg./l. for 1 hour as good or better plants were produced at much reduced cost.

4853. Roslak, N. A., and Šadrak, G. G.
The effectiveness of raising rootstocks in peat-compost pots. [Russian.]
Sadovodstvo, 1960, No. 4, pp. 22-3.

The use of these pots in the production of seedling apple rootstocks reduced costs by 25%.

4854. Lavee, S., and Samish, R. M.
Resistance of apple rootstocks to *Sclerotium rolfsii* (Sacc.)
Ktavim, 1960, **10**: 5-13, bibl. 9, illus.

The relative susceptibility of several rootstocks was established by growing them in the field and by experimental exposure to infection in containers. Relative resistance under both sets of conditions was similar, but because of variability in the material only 3 groups, showing low, medium and high resistance, could be established. The group formed by M.XVI and M.IX was most resistant, Ib (a local selection of Doucin), Hashabi, M.II and M.XIII were medium in resistance and M.V and Succari were most susceptible. A correlation was established between resistance to the disease and the intensity of a colour reaction, possibly due to a phenolic substance, in stem tissue extracts.

4855. Steckel, W.
Vergleich der jährlichen Ertragsschwankungen zwischen Bäumen auf Sämlingsunterlage und auf M.IX. **(A comparison between annual yield fluctuations of trees on seedling rootstocks and those of trees on M.IX.)**
ErwObstb., 1906, **2**: 118-19, bibl. 1.

From records presented for 3 apple varieties in full bearing for the years 1951-58 it is concluded that a reduction in yield fluctuations by means of a dwarfing rootstock can be achieved only in varieties with a pronounced tendency to biennial bearing. In varieties with more uniform annual yields fluctuations could not be eliminated either by the use of a dwarfing rootstock or by cultural measures.—Inst. Obstb., tech. Univ. Berlin.

4856. Rigg, T., and Chittenden, E. T.
Apple root-stock experiments.
Monogr. Cawthron Inst. **3**, 1959, pp. 22-50.

Trees on Northern Spy were used as a standard for comparing more vigorous stocks, which included Epps Seedling commercial grade, Double Vigour and several Malling stocks. The varieties tested included Cox's Orange, Jonathan, Sturmer, Statesman and Granny Smith. Results showed that on all soils of average fertility Double Vigour could be recommended for many apple varieties. With the 5 varieties mentioned above trees on Double Vigour were more robust than those on Northern Spy and more manageable than those on the vigorous stocks M.XII, M.XIII, M.XV and Epps Seedling.

4857. Tiscornia, J. R., and Gianotti, J. F.
Antecedentes sobre el cultivo de manzanos enanos en el alto valle del Río Negro. **(Preliminary observations on growing dwarf apple trees in the upper Río Negro valley.)**
Idia, 1960, No. 148, pp. 30-2, illus.

Rome Beauty and Delicious on the rootstock Jaune de Metz [M.IX?] at 27 years after planting averaged 14·5 cm. in trunk diameter 30 cm. above soil level and 2·5 m. in height, compared with 32 cm. and 5 m., respectively, for trees on seedling rootstocks. They began bearing at 4–5 years, producing approximately 150 kg. per tree, with very large fruit in the first few years. Yields were higher than those from trees on seedling or Northern Spy rootstocks. Resistance to collar rot [*Phytophthora* sp. ?] was an advantage outweighing superficial rooting.

4858. Tiscornia, J. R.
Frutales enanos—sus ventajas. **(Dwarf fruit trees—their advantages.)**
Bol. Divulg. téc. Estac. exp. agropec. Cinco Saltos **1**, 1960, pp. 9.

Notes on M. and MM. dwarfing stocks for apples with reference to their introduction into Argentina.

4859. Schneider, H.
Anatomy of bud-union bark of pear trees affected by decline.
From abstr. in *Phytopathology*, 1959, **49**: 550.

The first observed pathological change in the current annual ring of phloem was a callusing of sieve plates below the bud union. This was followed by lysis of the sieve-tube contents. Abnormal replacement phloem then formed in oriental rootstocks, but rarely in French stocks. In severely diseased trees the sieve tubes of the replacement phloem became necrotic almost as soon as they were formed. The rays expanded tangentially by hypertrophy and hyperplasia to crush the replacement phloem. The presence of this crushed tissue in annual phloem rings was useful for determining how many years a tree had been diseased. When bark was removed from the tree, the cambium at the bud union was sometimes brown and the annual rings were thickened.

4860. Jauhari, O. S., and Jit, A.
Air-layering in loquat (*Eriobotrya japonica* Lindl.) var. Pale Yellow, with the aid of growth regulators.
Sci. and Cult., 1960, **25**: 592, bibl. 1.

NAA was the most effective growth substance tested. When it was used in September at 10,000–30,000 p.p.m., 40–50% of the air-layers on 15-year-old trees rooted compared with 30–40% for IAA at 10,000–20,000 p.p.m., 20–30% for IBA at 20,000–30,000 p.p.m., and none for the controls. In February the only rooting obtained (20%) was with 20,000 p.p.m. NAA.—Govt. agric. Coll., Kanpur.

4861. Modoran, I.
Sporirea procentului de încolţire a seminţelor de sîmburoase. (**Increasing the germination percentage of stone fruit seeds.**) [English, French, Russian and German summaries ½ p. each.]
Grăd. Via Liv., 1959, **8**(12):47-9+summaries.

Shell permeability was found to be an important factor in determining the embryo development and germination of stone fruit seeds. The water content of the seeds should be maintained above 14% if good germination is to be obtained. Coarse sand, loam, peat, moss and sawdust were compared as media for stratifying cherry, myrobalan, plum and peach stones immediately after harvesting or after a period of 2 months; in both series the best results were obtained with moss.

4862. Lascar, V.
Criterii de apreciere a semincerilor la sîmburoase. (**Criteria for evaluating stone fruit trees as a source of seeds.**) [English, French, German and Russian summaries ½ p. each.]
Grăd. Via Liv., 1960, No. 2, pp. 39-40 + summaries.

With particular reference to the size of stones in cherry and myrobalan trees selected to provide seedling rootstocks.

4863. Marenaud, C.
La multiplication végétative sous brouillard artificiel. (**Vegetative propagation under mist.**)
Pomol. franç., 1959, No. 9, pp. 3-9, bibl. 1, illus.

In trials on 4-leaf cuttings, 7–10 cm. long, of 7 *Prunus* spp. under intermittent mist the best medium was 2 parts of fine river sand, 1 of coarse sand and 1 of rotted leaf mould. The cuttings were either dipped momentarily in a 50% alcoholic solution containing 4,000 p.p.m. of IBA or dusted with 8,000 p.p.m. of IBA. *P. persica* and *P. domestica* cuttings rooted much better when taken in April-May than when taken in August, but with *P. mahaleb* and *P. salicina* results were equally good in spring and autumn. *P. cerasifera, P. persica* and *P. domestica* took 14 to 20 days to root. *P. cerasifera* × *persica* showed 75–80% strike with, and 12% without, IBA treatment. The rooting of 5 Sainte Lucie clones ranged from 30 to 95%. Almond and apricot cuttings from mature trees rooted badly, but cuttings from juvenile apricot plants rooted fairly well. Good results were also obtained with some ornamentals, viz. thuja 100%, pink laurel 100%, camellia 70% and azalea 50%. —I.N.R.A. Stat. Rech., Grande Ferrade.

4864. Raptopoulos, T., and Kantartzis, N.
Sweet and sour cherry incompatibility on *Prunus mahaleb* stock as measured by their girth increase. [Greek, with English summary 1 p.]
Reprint from *Yearb. Sch. Agric. For. Aristotelian Univ. Thessal.*, 1959, pp. 15, bibl. 2.

The girth increases of 279 sweet cherry trees (10 varieties) and 110 sour cherry trees (5 varieties), all grafted on *Prunus mahaleb* seedlings, and the general performance and fruit yield of the scion varieties were recorded over a period of 9 years. Results showed that a definite and increasing decline in tree growth started in 7-year-old sweet and 5-year-old sour cherries. Some sweet cherry varieties suffered 50–100% mortality in their eighth year, but the sour cherries remained healthy and produced substantial yields even with declining growth. It was concluded that *Prunus mahaleb* stock was suitable for sour but not for sweet cherries.

4865. Leroy, Y.
Le griottier porte-greffe du cerisier. (**The morello as a rootstock for sweet cherry.**)
Rev. hort. Algér, 1959, **63**: 50-2, illus.

Bou Hamra cherries on morello rootstocks were still vigorous at 9 years old and showed no signs of gummosis. Growing without irrigation on siliceous clay alluvium, they were 3½ m. tall and yielded 30–40 kg. of fruit per annum.

4866. Hamada, S.
Propagation of mulberry trees in Japan.
Rev. Ver à Soie, 1958, **10**: 273-8, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 46,736.

Brief descriptions are given of methods used in Japan for bark grafting, veneer grafting, layering (both simple and continuous), division (of roots resulting from branches buried in the soil in layering), and hardwood and softwood cuttings. In Japan it is necessary to use electricity or some other means to warm the cutting beds. Clean sand is the best rooting medium and should be kept at a temperature of 25° C. for 20–25 days for hardwood cuttings and of 30° C. for 20 days for softwood cuttings.

Climatic factors.

(*See also* 4647-4651, 4654, 4657, 4794, 4905, 4906, 6319.)

4867. Šoškić, A.
Prilog poznavanju osetljivosti stabala nekih vrsta voćaka prema izmrzavanju. (**The susceptibility of some fruit trees to freezing.**) [English summary 1¾ pp.]
Zasht. Bilja, 1959, No. 51, pp. 69-81, bibl. 9, illus.

The plum variety Požegača was the most susceptible to frost damage of all the species and varieties in the test orchard, 76% of the trees showing injury. Cherry trees came next, with 45% affected. Jonathan was the least resistant apple variety, with 33% of the trunks showing damage. The few pear trees in the orchard were more resistant than the apples, with only 20% injury. Free draining soil leads to premature sap movement and to greater likelihood of frost injury.—Inst. agric. Res., Peć.

4868. Ginai, M. A.
Spring frost damage to fruit crops in Quetta region.
Punjab Fruit J., 1959, **22**(79): 1-11, bibl. 7, illus.

Observations on damage to deciduous fruits following 4° to 11° F. of frost on several nights in late March.

4869. Rollins, H. A., Jr.
Factors affecting the hardiness of the apple.
Diss. Abstr., 1960, **20**: 3006-8, bibl. 5, being *L.C. Card No. Mic.* 60-106 of 185 pp.

During the early part of the dormant season the varieties Staymared, Baldwin and Rome Beauty were more tender than Delicious or Franklin, while Hibernal, Virginia Crab, Columbia and *Malus robusta* No. 5 were found to possess a high degree of cold resistance. The varieties showing early hardiness increased in cold resistance more rapidly, attained maximum hardiness at an earlier date and likewise showed an earlier reduction in hardiness than did those which were more tender in early dormancy. Defoliation, late N application and scoring, carried out in mid-August on Yellow Transparent, delayed the normal maturing process and resulted in a reduction of hardiness throughout the dormant season. Hibernal interstock imparted hardiness to some scion varieties, but the effect was slight and of no commercial value. Pruning caused a sudden reduction in the hardiness of Yellow Transparent, but within a week the original resistance was re-established. M.II as an interstock reduced hardiness. The hardiness of Golden Delicious increased as the daily temperatures dropped and decreased following a period of unseasonably warm weather in November.—Ohio St. Univ.

4870. Kohn, H.
Experimenteller Beitrag zur Kenntnis der Frostresistenz von Rinde, Winterknospen und Blüten verschiedener Apfelsorten. (**An experimental contribution to our knowledge of the frost resistance of bark, fruit buds and flowers in several apple varieties.**) [English and French summaries ½ p. each.]
Gartenbauwiss., 1959, **24**: 314-29, bibl. 20.

The main annual curve of frost resistance of apple bark and fruit buds seems to be controlled endogenously, while weather conditions control the smaller fluctuations. This means that the hardiness of any individual tree may vary at different periods of the same winter as well as from one winter to another. Bark and fruit buds formed in the same year were found to be more tender than bark that was one or several years old. This was especially true in the autumn, when tender varieties were subject to injury by sudden early and heavy frosts. In mid-winter little danger of frost damage existed in the varieties tested, the less hardy varieties suffering no injury at —25° C. and the hardy varieties at —40 to —45° C. With the progress of spring, frost susceptibility increased, especially if periods of warm weather were followed by a sudden frost. With the advent of spring varietal differences in frost resistance decreased. There were no varietal differences in the hardiness of the flower, the pistil being the most sensitive part. At that time of the year frost injury to the bark of all varieties occurred at —6° to —8° C.—Bot. Inst., Univ. Innsbruck.

4871. Larcher, W., and Eggarter, H.
Anwendung des Triphenyltetrazoliumchlorids zur Beurteilung von Frostschäden in verschiedenen Achsengeweben bei *Pirus*-Arten, und Jahresgang der Resistenz. (**The application of triphenyltetrazolium chloride for evaluating frost damage in several tissues of the shoots of *Pyrus* spp., and annual fluctuations in resistance.**)
Reprint from *Protoplasma*, 1960, **51**: 595-619, bibl. 53, illus.

The frost resistance of one- to five-year-old shoots from adult trees of the heat-loving apple variety Gravenstein and the vigorous pear variety Speckbirne was tested experimentally several times from the end of August, 1957, to the end of the blossoming period in mid-May, 1958. When the shoots were placed in 1% buffered TTC solution the incidence of frost damage was clearly visible in all tissues, including the cambium. Living cells reduce the colourless TTC to insoluble red formazan, while dead cells remain unstained. In the course of the investigation black and red-brown discolorations in the bark tissue, in the medullary rays and in the medullary parenchyma were found to be reliable symptoms of injury, whereas cambium and xylem, which were discoloured brown, were not always frozen and colourless cambium was not always healthy. The hardiness of all tissues in the shoot fluctuates between maximum frost resistance in mid-winter and minimum resistance at the time of blossoming. Of all parts of the shoot parenchymatous tissues of the medullary rays and xylem were the most susceptible to frost damage in mid-winter. The cambium and the youngest growth of secondary bark were the most resistant tissues during the dormant season, the older secondary bark and the primary bark parenchyma being intermediate in frost hardiness. Before the buds began to swell in the spring the high degree of hardiness declined in all tissues, but most rapidly in the cambium. At blossom time—in contrast to the winter—the cambium was the most tender tissue and the xylem was the most resistant part of the shoot. The xylem remained hardy throughout the summer. After the completion of shoot growth in the spring the hardiness of the cambium rose a little and the bark became the most tender tissue.

4872. Žučkov, N. G.
After-effects of winter damage to fruit trees. [Russian.]
Sadovodstvo, 1960, No. 2, pp. 26-7.

Apple trees in the Leningrad region were damaged by the severe winter of 1955-56. Those not killed gradually recovered and appeared to be healthy until the very dry spring of 1959, when some branches developed small yellow leaves and shoots which quickly wilted. Histological examination of the affected branches showed damaged conducting tissues.

4873. Gerritsen, J. D.
De fruitteelt en de droogte. **(Fruit culture and the drought.)**
Fruitteelt, 1959, **49**: 1132-4, illus.

Observations are made on the effects of the drought conditions of 1959 in Holland on apples, pears, plums and cherries, as affected by soil structure and management, variety and rootstock.

4874. van Hennik, J. J.
De invloed van de droogte op de fruitgewassen. **(The effect of the drought on fruit crops.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1959, **22**: 692-4.

Brief notes on the responses of top and soft fruit varieties in Holland to the drought of 1959.

4875. Blommaert, K. L. J.
Winter temperature in relation to dormancy and the auxin and inhibitor content of peach buds. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1959, **2**: 507-14, bibl. 7.

Analyses of bud extracts from trees that had been subjected either to a relatively cold or a warm dormant period showed that, as dormancy was broken, the quantity of acid inhibitor dropped more rapidly in the extracts from the trees that had been subjected to the cold dormant period. It is suggested that adequate cold during the dormant period is required for the inactivation of the inhibitor in peach buds, and that delayed inactivation due to a relatively warm dormant period may account for delayed foliation of the trees. [See also *H.A.*, 28: 116.]

Soil management and irrigation.

(*See also* 4782-4784, 4819, 5233, 5234, 5243-5246, 5254.)

4876. Hooyman, C. J. J.
Is fruitteelt op komgronden mogelijk? **(Is fruit growing possible on basin clay?)**
Fruitteelt, 1960, **50**: 656-8, illus.

Apple and pear varieties on various rootstocks were planted on very heavy basin clay with constant water levels of either 140 cm. or 65 cm. or a water level of 65 cm. in summer and 140 cm. in winter. The effect of water level on growth and cropping was not significant. The rootstock had an important effect on performance, M.IV, I and XI giving the best results with apples and M.IX proving unsatisfactory; as regards pear rootstocks, quince was better than seedlings for Légipont, but Conference did well on either. Heavy dressings of P and K were required on this soil. Maintenance of a good soil structure was found to be essential, and for this purpose a permanent grass sward after the first 6 years is recommended.

4877. Gras, R.
Influence d'un horizon calcaire sur la vigueur du pommier. **(The influence of a calcareous horizon on the vigour of apple trees.)**
C.R. Acad. Agric. Fr., 1960, **46**: 57-9, bibl. 2.

In an 80-year-old orchard a significant correlation was found between trunk diameter and the depth below the surface of the calcareous layer. Only a few trees showed signs of chlorosis. The layer was not a physical barrier to root penetration, but foliar symptoms were similar to those caused by poor soil aeration.

4878. Hulshof, H. J., van der Kloes, L. J. J., and Schellekens, A. F. C. M.
Beworteling van appelbomen en bodemstructuur. **(Root development of apple trees in relation to soil structure.)** [English summary 12 lines].
Meded. Dir. Tuinb., 1960, **23**: 33-42, bibl. 19, illus.

Observations on the relationship between apple root development and soil structure were made on more than 100 soil profiles in marine and river clay areas. The importance of a study of soil structure is discussed.

4879. VOLZ, H.
Mechanische Bodenverdichtung und ihr Einfluss auf das Wurzelwachstum verschiedener Apfelunterlagen. **(Mechanical soil compaction and its influence on the root growth of various apple rootstocks.)**
ErwObstb., 1960, **2**: 107-10, bibl. 6, illus.
See *H.A.*, 30: 1682.

4880. KOLESNIKOV, V. A.
The depth of cultivation of orchard soils. [Russian.]
Sadovodstvo, 1960, No. 2, pp. 15-17.
It is suggested that the optimum depth of cultivation varies between 8 and 25 cm., depending partly on latitude and partly on other features of the management system. Deeper ploughing should be carried out in more southern latitudes, in unirrigated regions, under clean cultivation systems, and with apples and pears than with plums and cherries. If deep ploughing is done in the autumn, rapid regeneration of roots takes place and the reserves of organic material in the trees are replenished.

4881. MOATS, J. E.
The case for a quackgrass cover.
Western Fruit Gr, 1959, **13**(11): 9-10, illus.
Agropyron repens as a satisfactory permanent sward in an irrigated apple orchard.

4882. ABRAMENKO, N. F.
Soil management in mountainous non-irrigated orchards. [Russian.]
Sadovodstvo, 1960, No. 1, pp. 21-6, illus.
The inter-rows in a newly planted apple orchard on a north-easterly 10–12° slope at 1,300 m. elevation were planted with raspberries, potatoes and perennial grasses. Tree growth was best with the raspberries and potatoes, but the latter required some additional anti-erosion measures. In a bearing apple orchard on an 8–10° slope yields in plots with a complete sod cover or with sod plus a manure mulch under the spread of the crowns were greater than those with a sod cover in the alternate rows or with a sod cover and clean cultivation under the crown area.

4883. NAUMANN, W. D.
Weitere Untersuchungen über die Wirkung einer Spargel-Unterkultur auf Stoffwechsel und Wuchsleistung junger Obstgehölze. **(Further studies on the effect of intercropping with asparagus on the metabolism and growth of young fruit trees.)**
ErwObstb., 1960, **2**: 113-17, bibl. 7, illus.
In contrast to all other vegetable crops examined, asparagus, both as a preceding crop and as an intercrop, improved the water balance and the nutrient balance of fruit trees and thereby improved their growth, especially on medium and light soils. The reason for the favourable effect of asparagus is not known, but, as the roots of fruit trees follow the channels created by decaying asparagus roots, it is assumed that the trees benefit from the improvement in soil structure and from the decaying organic matter deposited in the soil. The root growth of the fruit trees was greatly enhanced. [For earlier work *H.A.*, 27: 3146.]—Inst. Obstb. u. Baumsch., tech. Hochsch. Hannover.

4884. BLASSE, W.
Der Einfluss unterschiedlicher Bodenpflegeverfahren im Obstbau auf den Verlauf der Bodenfeuchtigkeit 1958 und 1959. **(The effect of different methods of soil cultivation on the soil moisture curve in orchards, 1958 and 1959.)**
Dtsch. Gartenb., 1960, **7**: 102-5, illus.
A table, graphs and photographs illustrate the effects of different methods of cultivation on the soil moisture curve of an apple orchard. Repeated shallow cultivation during the spring and summer months had a favourable effect on soil moisture. Soil covering also proved beneficial, but mulching is not considered practicable on a large scale. Permanent grass had an unfavourable effect on yield and quality. The practice recommended under East German conditions is clean cultivation until the beginning or middle of July, followed by a green manuring. Where a green manure crop is not sown, weed growth should be encouraged.—Inst. Obstb., Humboldt-Univ. Berlin, Marquardt.

4885. WILCOX, J. C.
Effect of irrigation interval on peak flow requirements in sprinkler irrigated orchards.
Canad. J. Soil Sci., 1960, **40**: 99-104, bibl. 14.
Correlations were calculated between the peak flow of water per acre delivered to 174 orchards in the Okanagan Valley in 1958 and the irrigation interval used—that is, the interval between the start of one irrigation and the start of the next irrigation at the same location. Orchards were omitted where seepage water or wilting was in evidence. High negative correlations were obtained between irrigation interval and peak flow. It is concluded that the smaller the field capacity of the soil for moisture, and hence the shorter the irrigation interval, the greater is the required flow of water per acre. This is attributed to greater wastage of water with coarse-textured soils than with fine-textured soils. Some of this wastage is considered to be unavoidable. [Author's abstract].—Dep. Agric., Summerland, B.C.

Nutrition and tree composition.

(*See also* 4691-4693, 4696, 4701, 4772, 4819, 4978, 4982, 5160, 5161.)

4886. GRUPPE, W.
Bodenuntersuchung und Düngung im Obstbau. **(Soil analysis and manuring in fruit growing.)**
ErwObstb., 1960, **2**: 110-13, bibl. 12.

Preliminary, semi-official advice on the P, K, Ca and Mg manuring of fruit trees in north-western Germany.

4887. Bottini, E., and Sapetti, C.
Sullo stato nutrizionale dei terreni a frutteto della provincia di Torino. (**The nutritional status of orchard soils in the province of Turin.**)
Ann. Sper. agrar., 1960, **14**: 17-50, bibl. 8.

Apple, pear and peach soils of the Upper Canavese area: composition and manurial recommendations.

4888. Stiles, W. C.
Orchard practices affect apple condition, quality.
N. J. Agric., 1960, **42**(2): 4-6.

Summary of fertilizer effects on preharvest drop, colour and keeping quality, and of preharvest sprays on ripening.

4889. Rigg, T.
Effect of fertilizers on Dougherty apples.
Monogr. Cawthron Inst. 3, 1959, pp. 51-5, bibl. 2.

Yield records and field observations on 44-year-old Dougherty trees showed that the best results were obtained using a complete NPK fertilizer, and the poorest when K was omitted. Superphosphate + K maintained tree growth and fruit yield better then either K + N or P + N treatments.

4890. Shibukawa, K., and others.
Studies on leaf analysis of apple trees. I. A leaf analysis survey of apple orchards. [Japanese, with English summary 1 p.]
Misc. Publ. Aomori Apple Exp. Stat. **14**, 1959, pp. 7.

Determinations of the N, P and K contents of 1632 leaf samples of the Ralls, Jonathan and Delicious varieties collected from 870 orchards are tabulated. No correlations were found between the leaf contents of young and old trees, or between leaf concentrations and fertilizer applications. Critical levels for N, P and K for each variety in the Aomori prefecture are given.

4891. Pineau, N.
Influence de la fumure azotée dans un verger intensif de pommiers (après dix années d'expérimentation). (**The effect of nitrogenous fertilization in an intensive apple orchard after ten years' trials.**)
Pomol. franç., 1959, No. 8, pp. 3-6, illus.

Belle de Boskoop, Reine des Reinettes and Golden Delicious on seedling rootstocks, planted at 125 trees per ha., received high PK dressings plus 50, 80, 110, 140, 170 or 200 kg. N per ha. per annum. From 3 to 8 years old girth increase was proportional to N increments up to 140 kg. in one variety and up to 200 kg. in the others, shoot extension growth was proportional to N increments up to 140 kg. and N was unfavourable to flowering. From 8 to 12 years old framework formation was related to N fertilization in the same way as in the earlier period, except that the smallest dressings were not sufficient to promote any girth increments, but N now promoted flowering and fruit set. N affected fruit colour adversely in Belle de Boskoop and Reine des Reinettes but did not induce frost tenderness.

4892. van Lier, P.
Ureum-magnesiumbespuitingen in Limburg. (**Urea-magnesium sprays in Limburg.**)
Fruitteelt, 1960, **50**: 568-70.

Apple trees were sprayed with a solution of $\frac{1}{2}\%$ urea + 1% $MgSO_4$ at petal fall and twice more at intervals of 7–14 days. In combination with fungicides the sprays reduced mildew infection, especially early in the season. On lightly pruned, vigorous trees with heavy blossom the sprays improved fruit set and greatly increased yields. On vigorous young trees, however, spraying too late increased the amount of June drop.—R.T.C., Roermond.

4893. Kumashiro, K.
Fertilizer effects of slag on fruit trees growing on volcanic-ash soil. II. Comparison of the growth of young apple trees as affected by slag and the separate applications of its main components. [Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1959, **28**: 306-9, bibl. 5, illus.

When 1-year-old apple trees grown in pots of volcanic ash soil were treated with basic slag and its 3 main components, lime, silica and magnesia, a considerable growth increase was noted in the pots treated with slag and magnesia compared with those treated with lime and silica. Leaf analysis showed that plants treated with lime or silica were deficient in Mg. The top growth of the Mg-treated plants was superior to that of plants treated with slag, but the root growth was inferior. [For part I, see *H.A.*, 29 : 2134.]

4894. Eaves, C. A., Leefe, J. S., and MacEachern, C. R.
The influence of dolomitic limestone on the cation relationships in leaves, bark and roots of Cortland apple trees.
J. hort. Sci., 1960, **35**: 98-102, bibl. 11.

A 4-year study showed that the addition of dolomitic limestone to the soil resulted in an increase in the level of Mg and a decrease in the levels of K and Ca in the leaves, bark and roots of Cortland apple trees. These differences were most marked in the leaves. The established negative relationship between K and Mg in apple leaves was not found in either the bark or the roots.—Kentville Res. Stat., N.S.

4895. Allen, M.
The uptake of metallic ions by leaves of apple trees. I. The magnesium content of untreated leaves. II. The influence of certain anions on uptake from magnesium salts.
J. hort. Sci., 1960, **35**: 118-26, bibl. 13, and 127-35. bibl. 4.

In part I it is reported that significant changes in the Mg content of M.III apple leaves occurred during the course of a day. These changes were greater in young than in older leaves. The young leaves of shoots dipped in a 2% solution of hydrated Mg sulphate took up Mg more rapidly than the older leaves. The time elapsing between dipping and a subsequent increase in Mg content varied markedly between different experiments, ranging from 15 minutes to more than 2 days. In part II it is reported that when attached apple leaves were momentarily dipped in solutions of 3 Mg salts, Mg was taken up more rapidly and dependably from the chloride or nitrate than from the sulphate [see also *H.A.*, 30 : 203].—E. Malling Res. Stat., Kent.

4896. Roorda van Eysinga, J. P. N. L.
Proeven met chelaat bij fruit in Zuid-Limburg ter bestrijding van ijzerchlorose. **(Experiments with a chelate for control of lime-induced chlorosis in fruit trees in southern Limburg.)** [English summary 5 lines.]
Meded. Dir. Tuinb., 1960, **23**: 237-9, illus.

Severe lime-induced chlorosis in apple and pear trees, growing on a thin loess soil over chalk, was effectively corrected by a soil application of a solution of Fe-EDDHA. The chelate was applied at the beginning of June. Only the soil under the crown of the trees was treated; generally an application of 4 g. chelate per sq. m. was sufficient, but in very severe cases 8 g. per sq. m. were required. The treatment was effective for at least one year.—Inst. Bodemvruchtb., Groningen.

4897. (Wilcox, F. A.)
Controlling iron chlorosis.
Western Fruit Gr, 1959, **13**(8): 15, illus.

On pears, using Greenz 26 [see *H.A.*, 30 : 3305.]

4898. Naumann, W.-D.
Untersuchungen über den Mineralstoffgehalt im Blatt einiger Birnensorten bei Veredlung auf Unterlagen von *Pyrus communis*, *Pyrus amygdaliformis*, *Pyrus betulaefolia* und *Cydonia* A. **(Studies on the mineral composition of the leaves of certain pear varieties worked on *Pyrus communis*, *P. amygdaliformis*, *P. betulaefolia* and Quince A rootstocks.)** [English and French summaries 22 and 27 lines.]
Gartenbauwiss., 1959, **24**: 289-313, bibl. 38.

Pyrus amygdaliformis and *P. betulaefolia* increased leaf K and decreased leaf N and P, whereas the quince rootstock usually increased leaf Ca and decreased leaf K. Each of the varieties investigated showed a characteristic nutrient element composition of the leaves and typical seasonal changes. These varietal differences were particularly evident with P. The rootstocks altered the nutrient content of the scions, but not necessarily in the direction of its own mineral metabolism. Thus, examples were encountered in which a rootstock with a typically low K level increased the K content of a scion variety, and, conversely, a rootstock with a high P level decreased the P content of the scion. Environmental factors seemed to have the same effects on the mineral composition of pear leaves as on apple leaves. With the less compatible graft combinations variations in K content were particularly large. This suggests the possibility that certain types of incompatibility in pears may be related to disturbances in K metabolism.—Inst. Gartenb., Dresden-Pillnitz.

4899. Holtzem, H.
Ursolic acid from the leaves of *Pyrus communis* L. [German ?]
Arch. Pharm. Ber. dtsch, pharm. Ges., 1958, **291**: 308-10, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 23,386.

The dry leaves of different varieties of pear contained 0·5–1·3% of ursolic acid.

4900. Solopov, G. P.
Foliar nutrition of sour cherry with radioactive elements. [Russian, with English and German summaries.]
Vestn. s.-h. Nauki, 1957, **2**(2): 61-6, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100, 462.

Five-year-old trees of the sour cherry variety Vladimirskaja were sprayed in both mid-May and early June with various compounds, including Ra^{227} at 10^{-10} curie per ml., Co^{60} at 10^{-10} and Zn^{65} at $3{\cdot}2 \times 10^{-8}$. N, P and K had no effect, or in some cases a depressing effect, on yields. Cu, Mo, B + Cu and B + Mo gave yield increases of 25–35% and the radioactive microelements increases of 15–25%. The chlorophyll content of the leaves was raised by almost all the treatments, the increase produced by NP, PK, NPK, B, B + Mo, Cu + Mo and Ra^{227} being 300–400% on a fresh weight basis. The spray treatment did not appreciably alter the dry matter, sugar or vitamin C contents of the fruits.

4901. Lalatta, F., and Fontana, P.
Analisi del terreno e delle foglie in impianti di pesco e di melo. **(Analysis of soil and leaves in peach and apple orchards.)** [French summary 10 lines.]
Frutticoltura, 1960, **22**: 137-48, bibl. 6.

Contents of N, P and K are recorded. Foliar analysis showed 5 instances of N deficiency and 4 of K deficiency in 14 peach orchards, also 3 of K deficiency in 7 apple orchards, but these diagnoses did not correspond with the soil analyses concerned. Tree growth and yield were distinctly related to foliar N, but not to the levels of the major elements in the soil. The smallest discrepancy between foliar and soil analyses was that for K in peaches.—Staz. sper. Ortofruttic., Milano, and Univ. cattol. S. Cuore, Piacenza.

4902. Benucci, V.
Risultato di una concimazione su peschi affetti da gommosi interna. **(The effects of manuring on peach trees affected by internal gummosis.)**
Frutticoltura, 1960, **22**: 175-8, bibl. 9, illus.

Young peach trees of the variety Elberta, and to a lesser extent Mayflower and Precocissima Morettini, cut back without wound treatment, showed chlorosis, premature leaf fall and browning of the woody tissue in the twigs by internal mucilage, but no sign of fungal infection. Various combinations of fertilizers improved the condition. The best results were given by farmyard manure with a 2:1 mixture of ammonium sulphate and superphosphate at 0·4 kg. per tree. The stems were cut back to the strongest basal sucker and the wounds treated with bordeaux mixture and sealed. New growth in the following spring was healthy and vigorous, and continued so, while there was a marked reduction of gummosis in the old wood.—Ist. tec. agrar. Bagnoregio, Viterbo.

4903. Reeve, R. M., and Neufeld, C. H. H.
Histology and texture of Elberta peaches from trees of high and low levels of nitrogen nutrition.
Food Res., 1959, **24**: 552-63, bibl. 20, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-194.

Fruit from trees with high-N nutrition had more, but smaller parenchyma cells than that from trees grown under conditions of low N. The cell number was more important than cell size in determining fruit size in fruit from both sources. On canning the high-N fruit remained firm and finely textured, whereas the low-N fruit was coarse, stringy and often ragged in appearance.

4904. Primo Yúfera, E., Botella Soto, C., and Royo Iranzo, J.
Diagnóstico foliar. II. Relación entre ciertos estados anómalos del melocotonero y el contenido en oligoelementos de sus hojas. **(Foliar diagnosis. II. The relationship between certain abnormal conditions of peach trees and the contents of trace elements in their leaves.)**
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 323-30, bibl. 22, illus.

Figures collected from the literature are tabulated for normal foliar values of Cu, Fe, B, Mn and Zn in peach trees, for deficiencies of Mn and Zn, and for excess of B. Values for these elements are listed for leaves from healthy and chlorotic peach trees from 9 localities in Spain. There were no instances of deficiency of Cu or Mn, but all the chlorotic samples showed considerably higher B values than those in healthy leaves (51–76 p.p.m. as against 32–36 p.p.m.). Excess of B was accompanied, except in one case, by deficiency of Fe, and generally by a tendency to Zn deficiency.—Patron. Juan de la Cierva Fac. Cien., Valencia. [For part I, see *H.A.*, 30: 1155.]

Growth and physiology.

(*See also* 4673, 4755, 4840, 4875, 5223, 5635.)

4905. Tamás, P.
Über prinzipielle und methodologische Probleme der Bestimmung von thermischen Reaktionsnormen. **(On the fundamental and methodological problems concerning the determination of the mode of thermal reaction.)** [English and French summaries ¾ p. and 1 p.]
Gartenbauwiss., 1959, **24**: 265-88, bibl. 43.

The theory of the mode of thermal reaction (MTR) describes the life processes of plants as a function of the accumulated temperature sum. The theory interprets the life cycle of the plant as a series of consecutive and exactly definable phases of development. In the present paper the shoot growth of three apple varieties was studied. It was found that the rates of the growth during development were typical for each variety, and, in addition, that variations in these rates could be determined even when standard temperatures did not obtain for the experiment. On the basis of these findings it seems possible to elaborate systems for the study and characterization of the temperature sensitivity of plants even without strictly controlled conditions. For this reason the study described here deals largely with the principles on which the methods and use of the MTR determinations should be based. It is proposed that the determination of the MTR should be extended on a broad basis to many plant cultivars.—Balsgård, Fjälkestad, Sweden.

4906. Stoll, K., and Schaer, E.
Über Beziehungen zwischen Blühdatum und Reifezeit bei Obstsorten. **(On the relationship between flowering date and time of ripening in fruit varieties.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 225-8, bibl. 5.

Including data on time of flowering, time of picking, temperature sums and mean daily temperatures for the apple varieties Jonathan and Golden Delicious under the conditions of Wädenswil.

4907. Lotova, L. I.
Anatomical studies of the bark of large and small types of apple tree. [Russian.]
Vestn. Mosk. Univ., Ser. biol., 1959, **14**(3): 45-58, bibl. 18, illus.

In studies of the bark of *Malus pumila*, *M. frutescens* and *M. domestica* it was established that one major difference between them lies in the extent of the hard sclerenchymatous tissues in the secondary phloem, which influences the capacity of shoots to form roots during vegetative propagation. Rooting occurs fastest in cuttings of *M. pumila*, in which these hard fibres are almost non-existent. It was also found that in dwarf types of apple the cambial ring was proportionately smaller in circumference than in large types. [For earlier studies on the wood, see *H.A.*, 29: 1175w.]

4908. LALATTA, F., AND GORINI, F. L.
Ricerche sull'apparato radicale di meli adulti. **(Studies on the root systems of mature apple trees.)**
Ann. Sper. agrar., 1960, **14:** 51-73, bibl. 10, illus.

The trees were all on seedling rootstocks and comprised spreading open-centre forms of Arkansas and Stark King, and more upright Y forms of S. Giacinto and Golden Delicious, the 2 forms alternating at distances of 4·5 m. in rows 10 m. apart. Root density was greatest at a depth of 20–100 cm., still very considerable at 100–180 cm. and very small at 180–260 cm., and the horizontal extension was markedly greater than that of the crowns. The tap root had been replaced in every case by a number of almost vertical main roots. The system was more extensive and complex in the open-centre than in the Y forms, but there was no relationship between branch patterns and root patterns. The abundance of superficial roots was attributed to mulching with straw, although the rate of application was not high.—Staz. sper. Ortofruttic., Milan.

4909. KRAMER, S.
Untersuchungen von Wuchsmerkmalen bei Sauerkirschen in der Baumschule und am endgültigen Standort. **(Studies of growth characteristics in sour cherries both in the nursery and in the orchard.)** [Russian and English summaries 14 and 11 lines.]
Arch. Gartenb., 1960, **8**: 90-104, bibl. 18, illus.

In sour cherries the extent to which individual growth characteristics vary was found to depend on the part of the tree measured. The variation was greatest in the length of secondary vegetative shoots arising as laterals on the current year's leader shoots, somewhat less in the diameter of the scions, and still less in the diameter of the rootstocks and in the height of the trees. Furthermore, the variability declined with age, unless the soil in the orchard was particularly variable. The growth characteristics of maiden trees often showed deviations from the normal distribution. A closer correlation existed between the diameters of the rootstock and of the scion than between the diameter of the scion and shoot length. A relationship existed between the formation of secondary vegetative shoots by maiden trees and the vigour of the trees, many secondary shoots in the nursery being indicative of marked vigour in the orchard tree. It is suggested that the formation of secondary vegetative shoots should be taken into account in the testing, description and selection of new varieties.—Inst. Sonderkult., Karl-Marx-Univ., Leipzig.

4910. FEUCHT, W.
Zur Ortsnatur der fruchtenden Organe bei Süss- und Sauerkirschen. **(On the position of the fruiting organs in sweet and acid cherries.)** [English and French summaries about 10 lines each.]
Gartenbauwiss., 1959, **24**: 202-13, bibl. 13, illus.

A morphological study of the relationships between shoot growth, number of inflorescences and time of flowering.

4911. SUDNIK, N. S.
The effect of light intensity on the formation of photosynthetic apparatus in one-year-old cherry seedlings. [Russian.]
Fiziol. Rast., 1960, **7**: 214-16, bibl. 4.

Cherry seedlings were grown under 30% and 50% shade and in full light. Data are given on the effect of these treatments on the growth of the seedlings and the structure and chlorophyll content of the leaves. It is concluded that not only had light shading no harmful effect on growth, but certain characters, such as height and leaf number and size, were improved. At the end of August the total chlorophyll content of a plant grown in full light was 52 mg., of one grown under light shade 51 mg. and of another grown under heavy shade 26 mg.

Pruning and training.

(*See also* 4785, 4819, 4827, 5998.)

4912. JONKERS, H.
Over de relatie van uitbuigen, snoei en groei met de vruchtbaarheid. **(The relationships of branch bending, pruning and growth to fruitfulness.)**
Fruitteelt, 1960, **50**: 372-4, bibl. 18, illus.

A review, with particular reference to training young fruit trees.

4913. BALDASSARI, T.
La vecchia e la nuova potatura. Le vecchie e le nuove palmette. **(Pruning by old and new methods. Old and new palmette forms.)**
Frutticoltura, 1960, **22**: 209-30, illus.

The methods of training free palmette forms of apple, apricot, peach and pear trees are explained. The advantages of the free over the old formal palmettes are more even distribution of fruit on the branches and considerable reduction in the costs of pruning and harvesting.

4914. Ministry of Agriculture, London.
Winter pruning established apple and pear trees.
Adv. Leafl. Minist. Agric., Lond. **336**, revised 1959, pp. 5.

4915. Preston, A. P.
Pruning trials with Cox's Orange Pippin apple.
J. hort. Sci., 1960, **35**: 146-56, bibl. 12.

Winter pruning trials with the apple Cox's Orange Pippin on M.II, planted in 1945 on a loam soil, included open-centre and delayed open-centre tree shapes, and established-spur, renewal and regulated methods of pruning. Data are presented and discussed on tree size, weight of prunings, time taken to prune, incidence of mildew, total crop at different periods, fruit size and quality, hail damage, and the behaviour of trees that were deblossomed during the early years. Shape of tree had no direct effect upon growth and cropping, fruit size or quality. Regulated trees took the shortest time to prune and bore the heaviest crops. Established-spur-pruned trees took the longest time to prune and yielded least fruit. It took 11 years before the crops from renewal-pruned trees came within 20% of those from regulated trees. Trees that were deblossomed for the first 6 years were larger than normally treated trees. Their first crop almost equalled the accumulated crop from normally treated trees and they surpassed the latter in their later crops. The practical aspects of the trial, and means of further reducing the time and labour in pruning, are discussed. [Author's summary.]—E. Malling Res. Stat., Kent.

4916. Gremminger, W.
Kurzes oder langes Fruchtholz an Pyramiden? **(Short or long fruiting wood on pyramids?)**
Schweiz. Gartenbaubl. Solothurn, 1960, **81**: 134-5, from abstr. in *InformDienst Weihenstephan*, 1960, No. 4, p. 60.

Severe and light pruning of the fruiting wood were compared for three apple varieties on M.I. Light pruning produced much higher yields and required less labour.

4917. Cesari, C., and Forte, V.
La potatura delle drupacee. **(The pruning of stone-fruit trees.)**
Frutticoltura, 1960, **22**: 182-5, illus.

Mainly of peaches, with a note on apricots.

4918. Müller, H.
Beitrag zur Frage des Kronenbaues bei der Sauerkirsche. **(Crown formation in sour cherries.)** [Russian and English summaries ¾ p. each.]
Arch. Gartenb., 1959, **7**: 446-62, bibl. 7.

Morello and Diemitzer Amarelle cherries, each on *Prunus avium* and *P. mahaleb* rootstocks, were pruned under 4 systems, viz: (1) branch thinning every 3 years, (2) shoot thinning every year, (3) spur pruning, leaving 8–10 buds, and (4) spur pruning, leaving only 3–5 buds. These operations were carried out after the primary shaping was completed. Yields from systems (1) and (2) were very much higher than those from (3) and (4), and Diemitzer Amarelle was more productive on *P. avium* than on *P. mahaleb*. Production in the morello trees was little, if at all, influenced by rootstock. The amount of reduction in crown size by spur pruning was insufficient to warrant closer spacing of spur-pruned trees. The time required for pruning increased in the order (1), (2), (3), (4). The average weight of individual fruits was greater in (3) and (4) than in (1) and (2).—Inst. Gartenb. Dresden-Pillnitz.

Pollination and fruit set.

(*See also* 4820, 4929, 5138.)

4919. Hartmair, V., and Hölzl, H.
Ein Beitrag zur Frage der Lagerfähigkeit von Pollen verschiedener Obstgehölze. **(The storage of pollen of different varieties of fruit trees.)**
Mitt. Klosterneuburg, Ser. B, 1959, **9**: 1-6, bibl. 5.

From pollen of several apple, pear and plum varieties stored at 2–4° C. with 40% R.H., samples were taken regularly for germination tests. It was found that the varietal and environmental factors affecting the viability of fresh pollen have an influence also on its storage behaviour. In general, viability was good throughout the first 3 months, then it declined sharply during the next 2–3 months, and thereafter it declined more gradually. The pollen of some varieties with initially low viability stored better than pollen with initially high viability. It is likely that at lower temperatures the germination capacity of the pollen would have been preserved for a longer period.

4920. Ve̊j, A.-F.
A study of the vitality of pollen of 20 fruit tree varieties in the family Rosaceae. [Chinese.]
Čžiu šenlisjue̊ Tunsjun', 1957, No. 3, pp. 24-34, from *Ref. Ž* (*Biol.*), 1958, No. 22, Abstr. 100,439.

Among pollen grains examined at the Shanghai Pedagogic Institute that of *Persica* var. Shanghai Honey was the largest (0·073 ± 0·027 mm.) and that of *Eriobotrya japonica* the smallest (0·032 ± 0·001 mm.). Large, full pollen grains germinated well, small, irregularly shaped grains poorly. The pollens of different varieties of *Armeniaca* and *Prunus* showed great variations in size and shape and germinated poorly. The germination of pollen collected before the opening of the pollen sack was lower than that of pollen collected after it had opened. Of the media tested boiled water + 1·5% broth + 0·4M glucose was the most suitable, followed by a similar medium containing 0·4M sucrose instead of glucose. The addition of 0·06% of vitamin B to moistened pollen hastened germination in most varieties, whereas NAA, indolylacetic acid, bordeaux mixture and some other compounds retarded it. For *E. japonica* pollen the optimum temperature for germination was 20–24° C. Under favourable conditions germination started 1 hour after culturing.

4921. Löken, A.
Pollination studies in apple orchards of western Norway.
Proc. Xth int. Congr. Ent., 1956, 1958, **4**: 961-6, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 27,344.

The variable fruit set in Gravenstein is evaluated in relation to pollination insects. Diagrams present the number of bumble bees, honey bees and solitary bees in relation to temperature, sun and precipitation records. A table showing the number of clusters under observation, bee units, percentage fruit set, etc., for each tree each year is discussed. The data indicate that the number of pollinators is not the main factor responsible for the variable fruit set.—Univ. Bergen.

4922. Potanina, N. D., and Šmigel', V. N.
The effect of high-potential electrostatic fields on the pollen of certain fruit trees. [Russian.]
Bot. Žurnal, 1960, **45**: 266-72, bibl. 5, illus.

Subjecting apple and pear pollen to electric fields of 2, 4, 8 and 12 kv./cm. for 10, 30 or 60 seconds improved pollen germination, the length of the pollen tubes and longevity in storage. Pollination with treated pollen resulted in better fruit and seed set, increased fruit size and reduced fruit drop.

4923. Mišić, P. D.
Proućavanje bioloških i citogenetičkih odlika domaćih sorti krušaka. 1. Proučavanje mikrosporogeneze i osobina polena. **(Studies on the cytogenetical and biological characteristics of indigenous pear varieties. 1. Studies on microsporogenesis and pollen characteristics.)** [English summary 2 pp.]
Arh. poljopr. Nauk., 1959, **12**(38): 100-25, bibl. 41, illus.

Pollen of 23 diploid and 1 triploid Yugoslav varieties.

4924. Larsen, F. E.
Fruit set of hand-pollinated flowers of peach *(Prunus persica)* and apricot *(Prunus armeniaca)* in different micro-environments.
Diss. Abstr., 1960, **20**: 3461, being *L.C. Card No. Mic.* 60-550 of 118 pp.

Studies were conducted with polythene and waxed and unwaxed parchment bags placed over large branches as protectors against adverse weather, with the aim of increasing fruit set in a peach and apricot breeding programme. Fruit set in the parchment bags was, in general, improved and that in the polythene bags was reduced. Temperatures inside the bags were found to be from 1 to 2° F. lower at night and from 5 to 28° F. higher during the day than outside. No significant benefit was obtained from supplementary frost protectors placed over the branches. In the field the approximate time between the pollination and fertilization of 3 apricot varieties was 4 days.—Mich. St. Univ.

Fruit thinning and development.

(*See also* 4819, 4888, 6308.)

4925. (Batjer, L. P., and others.)
Soon: better control of fruit size.
Agric. Res. Wash., 1960, **8**(9): 7.

A chart has been devised from which growers can correlate early average weights of apples with final size and thus determine more precisely the thinning requirements of the crop. Good preliminary results have also been obtained with peaches [see also *H.A.*, 29: 2165 and 3310d] and pears.

4926. Bosch, E.
Versuche zur Brechung der Alternanz und Fruchtausdünnung der Apfelbäume mit alpha-Naphtylessigsäure. **(Experiments on the control of biennial bearing and on fruit thinning in apple trees by alpha-naphthalene-acetic acid.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 213-18, bibl. 2, illus.

In Swiss experiments very good control of biennial bearing has been obtained with Dirigol, an alpha-naphthaleneacetic acid preparation, provided it was applied at 80–90% petal fall. The optimum concentrations for individual varieties are recorded. Klarapfel should not be treated with Dirigol, as the chemical causes all the fruits to drop. Weak varieties require only a fine mist spray, whereas more vigorous varieties need a heavier application.

4927. Tukey, L. D.
Atmospheric moisture causes russeted apples.
Science for the Farmer, 1960, 7(4): 6, illus.

Enclosing young fruit in polythene bags caused cork formation from numerous small cracks in the cuticle. Rome Beauty, which has a moderately thick cuticle, cracked less than Golden Delicious, which has a thin cuticle. [See also *H.A.*, 30: 1731 and 3348.]

4928. Grisvard, P.
Essais d'utilisation de manchons de polyéthylène pour protéger les fruits sur l'arbre. **(Trials on the use of polythene bags to protect fruit on the tree.)**
Pomol. franç., 1959, No. 8, pp. 15-21, illus.

Polythene bags, made from 0·003 mm. thick film and measuring either 100 × 150 or 120 × 150 mm., were compared with kraft paper bags to protect developing apples and pears. The speed of fixing polythene bags was greater than for paper bags. Fruit fall was much the same for both types of bag. Pears and apples in polythene weighed 19·8 and 16·5% more respectively when harvested than those in paper bags. Losses from birds, wasps and disease were less in the polythene-protected fruit. Details of suitable bag dimensions are given for numerous varieties.

4929. Kozlova, N. A.
Certain morphological characteristics associated with the development of generative organs and seeds of the sour cherry *(Prunus cerasus)* variety Latvijskaja nizkaja. [Russian.]
Bot. Žurnal, 1960, **45**: 84-9, bibl. 22, illus.

A high proportion of the fruit of this popular sour cherry variety in Latvia produces undeveloped or no seeds. In pollination experiments the use of abundant pollen resulted in a higher percentage of fruit set and better embryo development. Underdevelopment or abortion of the seeds was found to be due to shortage of water during the early stages of embryogenesis. The development of only one of the twin ovules in the embryo resulted in better development of the conducting system.

4930. Shinn, W. R.
Growing cherries for the brining market.
Western Fruit Gr, 1960, **13**(2): 41, 44.

Factors affecting quality, notably maturity, in Oregon.

4931. Cesari, C., and Forte, V.
Il diradamento dei frutticini di pesco. **(Fruit thinning in peaches.)**
Frutticoltura, 1960, **22**: 267-9, illus.

General recommendations.

4932. Donoho, C. W., Jr., and Mitchell, A. E.
Chemical thinning of peaches using the sodium salt of 3 chlorophenoxy alpha propionic acid and naphthaleneacetic acid.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 558-62, bibl. 6.

The application of 3-CP at 250-300 p.p.m., sprayed beyond the drip point, significantly thinned Redhaven peaches, overthinned Halehaven, Kalehaven and Eau Claire peaches and produced severe foliage injury. Less thinning and only slight foliage injury occurred where the trees were sprayed to no more than the drip point on 1 side only. NAA at 30 p.p.m. applied to the foliage 28 days after bloom significantly thinned Redhaven trees but produced fruits which were smaller at maturity than those from untreated trees.

4933. Powell, L. E., and Pratt, C.
A comparison of adhering and abscising fruits of peach treated with N-1-naphthyl phthalamic acid.
Nature, 1960, **186**: 814-15, bibl. 5.

Halehaven peach trees were sprayed with 175 p.p.m. of the acid at the early petal-fall stage. Heavy fruit drop started 16 days after spraying, and the dropping fruits were comparable in size to fruits falling from unsprayed trees 1 month later. A comparison of sprayed and unsprayed fruits 16 days after spraying showed that ovules from adhering unsprayed fruit contained about 7 times as much of a substance similar to indoleacetic acid as ovules from sprayed fruit. The average number of cells in the embryo and the number of endosperm nuclei of abscising ovules were about 60% of those in the adhering ovules.—N.Y. St. agric. Exp. Stat., Geneva.

Fruit composition and quality.

(*See also* 4903, 4978, 4980, 4981.)

4934. (Kirkpatrick, M. E., and Little, R. R.)
Cell structure: key to apple quality.
Agric. Res. Wash., 1960, **8**(8): 8-9, illus.

Microscopic examination of apple fruits showed that good keeping quality depended on smoothness of skin and firm flesh with a high concentration of pectin and hemicellulose in the cell walls. There was no relationship between thickness of skin and keeping quality. It is suggested that firmness after cooking might depend on the amount and kind of cellulose, hemicellulose and pectins originally present, and on the extent of hydrolysis or alteration of these substances during storage or cooking.

4935. Raptopoulos, T., and Kantartzis, N.
Fruit pressure tests on three apple varieties.
[Greek, with English summary ¼ p.]
Reprint from *Geoponika*, 1959, No. 65, pp. 7, bibl. 11, illus.

Abondanza, Delicious and Golden Delicious apples were tested, over a period of 3 years, with the Magness and Taylor fruit pressure tester, and average pressure numbers were obtained for fruit firmness at harvesting, and for firm-ripe and over-ripe fruit. The original firmness of Abondanza deteriorated rapidly to produce a mealy flesh; Delicious acquired a soft flesh texture more slowly, and Golden Delicious, whilst losing its firmness quickly, remained crisp and juicy until July.—Univ. Thessalonika.

4936. Woodmansee, C. W., McClendon, J. H., and Somers, G. F.
Chemical changes associated with ripening of apples and tomatoes.
Food Res., 1959, **24**: 503-14, bibl. 28, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-194.

Certain constituents of apples (Red Delicious and

Stayman) and tomatoes (Brookston and Valiant) were determined at the unripe, ripe and overripe stages. The 70% alcohol-insoluble solids decreased significantly at the 1% level during the ripening of apples, and in Brookston tomatoes a decrease was observed at either the unripe to ripe or unripe to overripe stages. On a fresh weight basis the total pectin decreased significantly from the unripe to the overripe stages for Stayman apples and Valiant tomatoes, but for Red Delicious apples and Brookston tomatoes the decrease was not significant. [See also *H.A.*, 30: 255.]

4937. von Bargen, G.
Indol-3-Essigsäure im Apfel. (**Indole-3-acetic acid in the apple.**)
Planta, 1960, **55**: 112-14, bibl. 11.

Indole-3-acetic acid was found in vegetative buds and in the flesh of ripe fruits. The methods of preparation and determination are discussed.—Inst. Obstb., Univ. Bonn.

4938. Isherwood, F. A.
Texture of plant tissues.
Monogr. Soc. chem. Ind., 1960, **7**: 135-43, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-247.

In a study of the variation of cell-wall constituents during ripening, the polysaccharide contents of the cell walls of Conference pears were determined during storage at 5° or 15° [C.]. A fall in total polysaccharide content was correlated with a drastic thinning of the wall in overripe fruit. At 5° the wall was depleted further, but more slowly, than at 15°. The toughening effect of lignin is discussed.

4939. Kattan, A. A., and Rom, R. C.
Canning quality of Arkansas-grown peaches.
Ark. Fm Res., 1960, **9**(1): 9.

Elberta peaches, harvested at 3 stages of maturity (hard, firm and firm-ripe), were stored at 70° F. for 1, 2 or 3 days before canning. When the cans were examined 4 months later, the best quality was found in peaches that had been harvested at the firm-ripe stage, or at the firm stage and ripened for 2–3 days at 70° F. before processing.

4940. Attri, S. S.
A study of maturity indices for Halehaven peaches.
Diss. Abstr., 1960, **20**: 3451, being *L.C. Card No. Mic.* 60-722 of 122 pp.

The following indices afforded a reliable guide to the interpretation of maturity stages of peaches: firmness values measured with the Magness-Taylor and Durometer pressure testers, soluble solids/acids ratio, titrable acidity percentage, Gardner-Hunter "a", "a/b", "Rd" and "b" values and the Gardner-Hunter colour chart.—Ohio St. Univ.

4941. Sterling, C., and Kalb, A. J.
Pectic changes in peach during ripening.
Bot. Gaz., 1959, **121**: 111-13, bibl. 27.

During the ripening of the Elberta peach there is a continual decrease in the methyl ester content of the pectic substances. Coincidentally, the proportion of water-soluble pectin increases, that of acid-soluble pectic material decreases, and the total pectic content also decreases. Results are discussed in relation to the mechanism of tissue softening. [Authors summary.]—Univ. Calif., Davis.

Harvesting, packing and marketing

(*See also* 4733-4737, 4745, 4820, 4935, 4939, 5355.)

4942. Fridley, R. B., and Adrian, P. A.
Some aspects of vibratory fruit harvesting.
Agric. Engng St. Joseph, Mich., 1960, **41**: 28-31, bibl. 4, illus.

See *H.A.*, 29: 149.

4943. (Fridley, R. B., Kaupke, C., and Adrian, P. A.)
New gains in harvest mechanization.
Western Fruit Gr, 1960, **14**(1): 18, illus.

Webbed canvas baffles placed over catching frames to minimize bruising of apricots and peaches when using mechanical shakers.

4944. (Tyler, H.)
Knocker, catching frame called "promising" in cling harvest tests.
Western Fruit Gr, 1959, **13**(11): 20, illus.

Mechanical peach harvesting using a Goodwin Red Head Knocker, a tractor-drawn catching frame, 30 ft. in diameter, and a conveyor belt delivering the fruit to pallet bins.

4945. Stollsteimer, J. F.
Comparative study made of lugs and bins for fruit handling between orchard and packing plant.
Calif. Agric., 1960, **14**(3): 3-4, 15, illus.

Costs are analysed for 3 methods of lug [field box] handling and 3 methods of bin handling for rates of output varying from 50 to 300 lugs per hour and for hauling distances of 1, 3, 5 and 10 miles. With longer hauling distances the point at which bins became the more economical container occurred at relatively low rates of output. When container and handling costs were combined, bins proved the more economical container throughout the range of operating conditions considered.—Univ. Calif., Berkeley.

4946. Ginsburg, L.
Modern trends in packing, handling and storage.
Dec. Fruit Gr, 1959, **9**: 345-51, illus.

Methods of bulk handling of apples, pears and peaches are discussed. The total crop of apples per farm should be greater than 5,000 bushels of not more than 5 varieties for bulk handling to be economical. Treatments to control superficial scald, new packaging materials, food preservation by ionizing radiations and the use of refrigerated rail trucks are other topics discussed.—Fruit Res. Stat., Stellenbosch.

4947. LÖTTER, J. DE V.
A bin harvesting system applied with success for apples and pears.
Dec. Fruit Gr, 1960, **10**: 14-19, illus.

Bulk harvesting methods in South Africa described with details of operating costs and capital outlay.

4948. LÖTTER, J. DE V.
Does crate-harvesting increase injury to apples?
Dec. Fruit Gr, 1959, **9**: 336-8, bibl. 5, illus.

Bulk harvesting in 35-bushel bins reduced bruising and injury compared with harvesting in 1-bushel lugs. Stem marks appeared to depend more on variety than on method of harvesting.

4949. ANON.
Bulk handling of apples: effect on bruising.
Rep. Hort. Div. I, Minist. Agric. Lond., 1960, pp. 8 + appendices, bibl. 16, condensed as
Bulk bins are better than bushel boxes.
Grower, 1960, **54**: 52-3, illus.

The extent of bruising caused by different methods of handling Bramley's Seedling apples was investigated on 3 farms in 1959 and 1960. The conclusions drawn were that harvesting into bulk bins is likely to cause less bruising than harvesting into bushel boxes and that such bruising can be minimized by using relatively shallow bins, not deeper than 21 inches. However, harvesting into half bushel trays caused less bruising than harvesting into bins. Appendices to the report include notes on bulk handling equipment and bin sizes, on bulk handling in overseas countries and on the reduction of bruising on imported fruit packed in bulk bins.

4950. FLEMING, C. P., AND WILSON, A. G. L.
Bulk handling of apples and pears.
Tasm. J. Agric., 1960, **31**: 98-108, illus.

Handling in the orchard and packing shed, cool storage, bin construction and installation costs described in some detail with the aid of illustrations.

4951. ANON.
Boom for apple bins.
Western Fruit Gr, 1959, **13**(10): 20-1.

The use of pallet bins for harvesting and storing Washington apples has produced less bruising, made more rapid cooling in cold storage possible and has allowed the crop to be examined more readily.

4952. ANON.
Fast handling in bins.
Western Fruit Gr, 1959, **13**(7): 17, illus.

A note on plywood bins for apple harvesting.

4953. GASTON, H. P., AND LEVIN, J. H.
Handling apples in bulk boxes.
Spec. Bull. Mich. agric. Exp. Stat. **409**, revised 1959, pp. 19, bibl. 2, illus.

Various types of pallet bin are described, with notes on bulk handling, necessary equipment and costs.

4954. DAHLING, R.
Bins score hit with canning firm.
Western Fruit Gr. 1959, **13**(7): 19-20, illus.

Plywood bins 47×47×27½ in. suitable for Bartlett pears.

4955. ANON.
Trailer speeds fruit harvest.
Western Fruit Gr, 1959, **13**(11): 16, illus.

An open-sided straddle trailer with a floor that can be lowered, capable of handling pallet stacks of boxes or bins at a rate equivalent to more than 9,000 apple boxes a day.

4956. ANON.
The "floater" bulk bin unloader eliminates apple bruising.
Comm. Gr, 1960, No. 3368, p. 167, illus.
Floater to unload bulk bins to be made here.
Grower, 1960, **54**: 162.

Equipment consisting of roller conveyors, a water tank and a slatted elevator is to be manufactured by a Sussex firm. Two electric motors, one to drive the elevator and the other to drive a centrifugal pump to circulate the water, are used. Any size of bulk bin can be used since the equipment can be made to suit individual conditions. Orchard bulk bins are placed by a fore-end loader on to a roller conveyor, the end of which is hinged and projects over a water tank. The bin slides gently at an angle of 22° into the water. As the bin sinks the surface fruit starts to float away in the flow created by the centrifugal pump. The fruit floats over a weir on to a slatted conveyor, from which defective fruits can be removed, and then passes into a rinsing, drying and polishing machine. When emptied the bin is inverted manually on to a take-away conveyor immediately above and across the tank. The water also removes any harmful spray deposits. A plant with a throughput of 600 bushels per hour will cost between £800 and £1,000.

4957. HERRICK, J. F., Jr.
A new automatic pallet box filler for apples.
Agric. Mktg, 1960, **5**(5): 10, illus.
Pallet box filler promises saving.
Bett. Fruit, 1960, **54**(10): 14-15, illus.

Pallet boxes are being increasingly used for the storage of fresh apples. The filler, which consists of rotating discs and baffles, is lowered into the empty box and then, as the apples flow in, lifted by a hydraulic lift until the box is full, when the mechanism turns itself off. Tests showed that the automatic filler causes no appreciable bruising.

4958. French, B. C., and Gillette, D. G.
Cost of assembling and packing apples as related to scale of operation.
Tech. Bull. Mich. St. Univ. **272,** 1959, pp. 67, bibl. in text.

Increasing the capacity of the packing plant from 50 to 800 field crates per hour reduces costs by as much as 24%. The percentage decrease in unit cost with increased capacity is greater for the more involved and costly operations. Tractors and orchard trailers are most efficient for haulage distances of under 5 miles, but for longer distances the use of highway trucks increases efficiency.

4959. (Sutherland, D. J.)
Grader research.
B.C. F.G.A. quart. Rep., 1959, **4**(3): 27-38.

Report of a study of apple grading methods and equipment in use in Holland, Germany, England, the United States and Canada.

4960. Elam, F. L.
Sampler for bins.
Western Fruit Gr, 1959, **13**(7): 23, illus.

Samples of harvested peaches fall through slits in the conveyor belt.

4961. Podany, J. C., and Farris, D. E.
Costs of packing Arkansas peaches in 1958.
Mktg Res. Rep. U.S. Dep. Agric. **361,** 1959, pp. 16.

For report on Michigan peaches, see *H.A.*, 30: 1757.

4962. Ross, A. D.
The seasonality of apple supplies in the United Kingdom.
Quart. Rev. agric. Econ., 1960, **13**: 25-32, bibl. 7.

After considering the pre- and post-war positions, marketing, import policies, etc., it is concluded that the U.K. will continue to afford a good market for Australian apples, but probably not as large or remunerative as in the past.

4963. Lamborn, E. W., and Park, W. L.
Consumer preference and demand for different sizes of Red Delicious apples in retail stores, Salt Lake City, 1957.
Bull. Utah agric. Exp. Stat. **410,** 1959, pp. 12, illus.

Apple consumers in medium- and low-income areas preferred larger apples, whereas customers in a high-income area divided their purchases more equally between large and small apples. Immediately before Thanksgiving customers preferred larger apples. As the price of small apples was decreased relative to that of large apples, the volume of sales of small apples per day increased substantially, while little change was apparent in the number of large apples sold. [From authors' summary.]

Storage.

(*See also* 4738-4744, 4938, 4946, 5130, 5131, 5184.)

4964. Rostos, G. M.
A survey of fruit cool stores.
Bull. C.S.I.R.O., Aust. **282,** 1960, pp. 76. bibl. 14, illus.

Fruit temperatures and their variations, rates of cooling and weight losses of fruit were studied in 23 cool rooms of 14 types. Most of the rooms were used for storing pears, some for apples and a few for the rapid cooling of pears and peaches prior to canning. Even in the most uniform rooms variations of 3–4° F. were recorded, in others they ranged up to 7° F. or more. The degree of temperature uniformity was practically identical in the best natural-circulation and the best forced-circulation rooms, poor uniformity being due to defects in design or operation. Temperatures of 35° F. or below were attained in 3 days when the rooms were filled slowly and judiciously. There were large differences in the rates of loss of water from the fruit during storage, the causes of which are discussed.

4965. Hilkenbäumer, F., and Buchloh, G.
Die Obstlagerung im Erzeugerbetrieb. **(Fruit storage by the grower.)**
Reprint from *Elektrizität*, 1959, **59**: 122-6, illus.

A discussion of the equipment available to larger growers for the storage of apples and pears on West German farms.

4966. Pratella, G. C.
La microflora delle celle frigorifere. **(The microflora of cold storage chambers.)** [French summary ¼ p.]
Frutticoltura, 1960, **22**:153-63, illus.

The principal fungi damaging apples in cold storage are described and control measures are outlined, including care in harvesting and transport, control of temperature and atmospheric composition during storage, application of short-wave radiation (X-, γ- and β-rays) to various fruits, and disinfection of the fruit before harvesting and of the chambers before use. Chemicals recommended for use in cold chambers are lime, formalin, sulphur, metaformaldehyde, sodium hypochlorite, and lauryl-dimethyl-carboxymethyl ammonia mixed with an organic boron compound. Ozone has also given promising results.—Ist. Pat. veg., Univ. Bologna.

4967. Martin, D.
Gas storage of fruit.
Refrig. J., 1959, **12**: 25-9, reprinted in *Food Pres. Quart.*, 1959, **19**: 67-9.

An outline, covering history, method of operation, engineering requirements, costs and advantages and disadvantages.

4968. NEL, J. G.
Gas storage of apples and pears.
Dec. Fruit Gr, 1960, **10**: 34-7, illus.

Diagrams of English and Dutch designs of gas storage rooms are presented. The storage lives of 10 apple and 6 pear varieties in common, cold and gas stores are compared, and optimum CO_2 and O_2 concentrations are listed for some varieties.

4969. EAVES, C. A.
A modified-atmosphere system for packages of stored fruit.
J. hort. Sci., 1960, **35**: 110-17, bibl. 6, illus.

A method is described for the maintenance of modified atmospheres in gas-proof plastic containers for the storage of fruits. Perforated bags containing fresh hydrated lime and calcium chloride were inserted to regulate the CO_2 and moisture content, respectively, and the O_2 supply was maintained by perforations in the wall of the container. Studies with McIntosh Red and Delicious apples indicate that it is possible to maintain desirable gas concentrations at 0°, 3–5° and 21° C. The removal of excess moisture with calcium chloride was associated with a reduction in fungal wastage. [Author's summary.]—Kentville Res. Stat., N.S.

4970. JOHANSSON, E.
Förvaringsförsök med päron och äpple vid Alnarp 1954-1958. (**Storage trials with pears and apples at Alnarp, 1954-58.**) [English and Esperanto summaries pp. 2½ and p. 1.]
Medd. Trädgardsförs. Alnarp **129**, 1960, pp. 56, bibl. 26.

Different rootstocks and different methods of storage were compared in these trials, which gave the following, among other, results: *Pears*: When kept at 7° or 15° C. after removal from cold storage (0·5°–1° C.) the following varieties ripened normally: Charneu, Conference, Doyenné du Comice and Herzogin Elsa. The ripening of some other varieties varied from year to year, and others either suffered damage during cold storage or never ripened well. Fruit from trees on quince ripened better than that from trees on seedling pear rootstocks, but there was little difference in keeping quality. Three post-blossom urea sprays caused slightly delayed ripening, though storage was little affected. In 1956 spraying with TMTD resulted in better fruit quality at harvest than spraying with bordeaux mixture. At temperatures of 10–14° C. fruits of 10 varieties could be kept satisfactorily for 3–4 weeks. In a comparison between cold and gas storage keeping quality was good in both cases, but weight loss was considerably reduced by gas. Two varieties proved susceptible to damage by CO_2. Loss of weight was smaller in polythene-lined than in paper-lined boxes. With some varieties a temperature of 3° C. encouraged rotting and physiological disorders. *Apples*: The varieties Cortland, Cox's Orange, Lundbytorp and Laxton's Superb kept very well, gloeosporium rot being by far the most important cause of losses during storage. Fruits from trees on dwarfing rootstocks (M.IX and M.IV) were mostly bigger and ripened sooner on the tree than those from trees on vigorous rootstocks (M.XVI and A.2), but the rootstock had little effect on keeping quality. The response to urea was similar to that of pears. Post-blossom sprays of captan or TMTD checked gloeosporium rot better than sulphur sprays. At temperatures of 10–14° C. the loss of weight was very much greater than in cold storage. Polythene-lined boxes again proved superior to paper-lined boxes. Polythene bags prevented loss of weight, but they were conducive to scald, low temperature injury and gloeosporium rot. There were differences in storage behaviour from year to year.

4971. HANSEN, H.
Das Lagerverhalten der Sorte Golden Delicious. (**The storage behaviour of the variety Golden Delicious.**)
Bad. Obst-u. Gartenb., 1959, **52**: 356-7, from abstr. in *InformDienst Weihenstephan*, 1960, No. 4, p. 56.

In cold storage Golden Delicious could be kept until March, especially if air scrubbing was used. Gas storage, which suited the variety better, extended the storage period to April/May. Fruits from three localities were compared. Well coloured apples kept until March in polythene bags at 2° or 3° C., provided the bags were pierced to allow accumulated CO_2 to escape.

4972. ZAHRADNIK, J. W.
Apple storage improved.
J. Amer. Soc. heat. refrig. Engrs, 1959, **1**(12): 58-60, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-247.

McIntosh apples could be stored for 6–8 months when the temperature was maintained at 37° F. ± 1·5° F. and the R.H. at 85–90% in an atmosphere of 3% O_2, 5% CO_2 and 92% N_2. The necessary equipment is described. A space of 2·5 cu. ft. per box of apples should be allowed. After loading and sealing the composition of the atmosphere was 17–21% O_2 and 79–83% N_2 and was gradually modified. Excess CO_2 was removed by scrubbing the atmosphere with NaOH.

4973. FISHER, D. V.
Cooling rates of apples at 31° F. packed in different bushel containers and stacked at different spacings.
B.C. F.G.A. quart. Rep., 1959, **4**(3): 6.

Cooling tests comparing wood versus various cell and tray pack cardboard bushel containers were carried out, using wide, medium and tight spacings. Packed fruit at a temperature of approximately 64° F. was loaded into a 31° F. commercial storage room with good air circulation. The best cooling occurred with wide container spacing, and the upper boxes in stacks cooled faster and to a lower final temperature than boxes in the centre of stacks. The mean time required for fruit temperature in all packages to fall from 64° to 35° F. was, respectively, 4·1, 5·7 and 6·0 days for wide, medium and tight spacing; final equilibrium temperatures of 32·4, 32·7 and 32·9° F. were reached in 9·4, 10·5 and 10·9 days, respectively. Differences in cooling rates for wood versus ventilated and non-ventilated cartons were not large. Cartons of apples in storage trays, stacked solid on pallets or with loose lock-stack spacing, required 15 days and 7·5 days, respectively, to drop from 64° F. to a stabilized temperature in a 30·5° F. storage room; the final fruit temperature with solid stacking was 1° F. higher than with lock stacking. [See also *H.A.*, 30: 1765]—Res. Stat., Summerland.

4974. van Belle, G.
Kisttype en opslag van fruit. **(The effect of box type on fruit storage quality.)**
Fruitteelt, 1960, **50**: 497-9, illus.

Various types of standard fruit boxes, half boxes and flower trays were compared for the storage of Goudreinette and Jonathan apples in ventilated cold stores and air-cooled stores. The best results, as assessed by weight loss and bruising, were obtained with the standard fruit boxes, without legs, and with narrow gaps (not more than 1 cm.) between the slats. Lining the interior of the box with corrugated paper improved quality and reduced bruising, especially in the boxes with widely spaced slats. [See also *H.A.*, 29: 3308k.]—I.B.V.T., Wageningen.

4975. van Belle, G.
Bodemconstructie van fruitkisten. **(The construction of the bottom of fruit boxes.)**
Fruitteelt, 1960, **50**: 626, illus.

Most apple boxes have gaps of about 2 cm. wide between the bottom slats and often between the side slats also. Trials have shown that when the edges of the slats are unrounded considerable bruising of the fruit occurs; this bruising is reduced, but not eliminated, by using slats with rounded edges. Lining with corrugated paper does not greatly reduce the bruising. If the gaps between slats are less than 1 cm. wide, however, bruising caused by pressure on the edges does not occur when the edges are straight, but it does occur when they are rounded.—I.B.V.T., Wageningen.

4976. Padfield, C. A. S.
Effect of apple and pear box liners on fruit in cool storage.
N.Z. J. agric. Res., 1960, **3**: 268-75, bibl. 6.

With most varieties tested the use of case-liners reduced both wilt and loss of weight, polythene bag liners being the most effective. With certain varieties, however, polythene often increased the incidence of other storage disorders, "off" odours and flavours and so cannot be recommended. Polythene sheet showed little advantage over waxed paper liners.—D.S.I.R., Havelock North.

4977. Marcellin, P.
Contribution à l'étude du microclimat réalisé dans des emballages de matière plastique contenant des fruits. **(A contribution to the study of the microclimate inside plastic bags containing fruit.)**
C. R. Acad. Agric. Fr., 1960, **46**: 115-22, bibl. 2.

The partial pressures of O_2 and CO_2 inside polythene bags containing Williams' pears stored at 15° C. was studied in relation to the condition of the fruit. With storage in completely closed bags CO_2 output by the fruit was practically stabilized at its original level. CO_2 evolution in bags with 1, 3 or 5 holes, 300μ in diameter, was less retarded, the larger the number of holes. CO_2 production was shown to be controlled by the O_2 tension inside the bag.

4978. Askew, H. O., and others.
Chemical investigations on bitter pit of apples. I. Physical and chemical changes in leaves and fruits of Cox's Orange variety during the season. II. The effect of supplementary mineral sprays on incidence of pitting and on chemical composition of Cox's Orange fruit and leaves. III. Chemical composition of affected and neighbouring healthy trees.
N.Z. J. agric. Res., 1959, **2**: 1167-86, bibl. 3; 1960, **3**: 141-68, bibl. 5, and 169-78, bibl. 7.

Part I. Fruits and leaves were examined for size and dry matter content, and were analysed for contents of minerals, N and sugars for 2 seasons. Appreciable differences, especially in mineral and N contents, were found for the 2 seasons. N, Ca, Mg, K, Na and P percentages decreased, but accumulation of these elements occurred steadily with growth of the fruits. On the other hand, leaves increased in ash, Ca and Mg contents, but decreased in K, Na, P and N, with increasing age. Expressed on the fresh basis, leaves were much richer than fruits in all these elements, especially in the latter half of the season. On both a fresh and dry basis fructose and sucrose increased, but glucose remained relatively constant, with increasing size, although the amounts of all 3 sugars on the per-fruit basis rose rapidly. Leaves were relatively poor in sugars. In the leaves sucrose was relatively high when fructose was low and vice versa.

Part II. An attempt to control bitter pit by spraying the trees with aqueous acetate solutions of Ca, Mg, K and Na in December and January is described. Both fruit and leaves changed in composition and dry-matter content between mid-January and harvest time in February or March, not only in respect of mineral and N content, but also in the amounts of acids and sugars present. In one season the Ca spray significantly reduced the amount of bitter pit in one orchard, but it had no significantly beneficial effect in a second season. In another orchard in this second season Ca gave the best results, although not significantly so. In all three trials K was detrimental, significantly increasing the amount of pitting. Na and Mg were detrimental also. High dry-matter and ash contents and high values of the ratio K/Ca in the fruit were associated with increased amounts of bitter pit. Chemical data for leader leaves appeared to be more valuable than those for spur leaves for diagnostic purposes; a high Ca content and high values for the Ca/K ratio were associated with a reduction in bitter pit in the fruit.

Part III. The third paper records the results of analyses on discoloured tissue and neighbouring apparently healthy tissue from Cox fruit affected with bitter pit. Discoloured tissue was higher in total ash, Ca, Mg, K, Na, P and N than neighbouring healthy tissue. The Mg content of the former was 4 times that of the latter. Whereas healthy tissue was generally similar in mineral composition to that of whole peeled fruits at time of storage, the former was poorer in Ca. There is evidence of a general migration of minerals and N from the healthy to the affected tissues. Tissue from the affected areas was very low in sucrose but was well supplied with glucose and fructose. It was richer in glucose than the neighbouring healthy tissue. Reducing sugars increased markedly during storage. Apparently healthy tissue was comparable in sucrose content to that of the whole fruit at time of harvest. The starch content of affected tissue was 0·81% and 1·17% in fruit from 2 orchards, while accompanying healthy tissue showed only 0·19% and 0·13%, respectively. The total ash content was significantly positively related to increasing incidence of bitter pit. High values of the ratios Mg/Ca, K/Mg, K/Ca and K/N accompanied a high incidence of bitter pit in the fruit. [From authors' summaries. For short accounts of this work, see *H.A.*, 29: 3256 and Report of the Cawthorn Institute for 1958–59 summarized in this number of *H.A.*]

4979. CONWAY, T.
Reducing incidence of bitter pit in apples.
N.Z. J. Agric., 1960, **100**: 28.

Bitter pit is most serious in Cox and precautions recommended to restrict its incidence include: (1) the use of N fertilizer in moderation or, if trees are growing well, the omission of N; (2) pruning the trees to induce only moderate growth and encourage lateral fruiting; (3) encouraging regular cropping, possibly by means of chemical thinning; (4) avoiding late, heavy irrigation near harvesting time; and (5) harvesting 8–10 days later than has been usual hitherto. Fruit from young trees should be marketed promptly before its condition deteriorates.

4980 HILKENBÄUMER, F., BUCHLOH, G., and ZACHARIAE, A.
Zur Ätiologie der Stippigkeit von Apfelfrüchten. I. Mitteilung. **(On the etiology of bitter pit in apple fruits. 1st communication.)**
Angew. Bot., 1960, **24**: 38-45, bibl. 11.

The authors found that apple fruit tissues affected by bitter pit are characterized by: (1) increases in total and protein nitrogen; (2) a marked reduction in total calcium, though the relative content of soluble calcium is increased; and (3) the presence of citric acid, which is the only aliphatic carbonic acid in Golden Delicious and Ontario and the predominant acid in Cox's Orange. The possible significance of these chemical changes is discussed. With regard to the low calcium level it is assumed that in diseased tissues Ca is dissolved, probably with the participation of citric acid, and translocated to other regions of the parenchyma.—Inst. Obstb., Univ. Bonn.

4981. BÜNEMANN, G.
Zusammenhänge zwischen Stickstoff- und Kationengehalt und Auftreten von Stippigkeit bei Äpfeln verschiedener Sorten und Herkünfte. (Vorläufige Mitteilung.) **(The relationship between nitrogen and cation content and the incidence of bitter pit in apples of different varieties and origin. (Preliminary communication.)** [English and French summaries 9 and 8 lines.]
Gartenbauwiss., 1959, **24**: 330-3, bibl. 5.

The weight of the ash of pitted parts of the apple was much greater than that of healthy tissue. Expressed as per cent. of dry matter the mineral content of the pitted parts was generally increased, but completely different results were obtained if the data were expressed as per cent. of ash weight; K remained nearly unchanged, whereas Ca declined and Mg rose in pitted tissues.—Inst. Obstb. Baumsch., tech. Hochsch., Hannover.

4982. GERRITSEN, J. D.
Stip en bespuiting met meststoffen. **(Bitter pit and nutrient spraying.)**
Fruitteelt, 1960, **50**: 467.

After several months' storage there was considerably more bitter pit on fruit of Cox's Orange trees sprayed with 2% Mg sulphate than on fruit from unsprayed trees. Fruit from sprayed trees on M.VII developed slightly more bitter pit than fruit from sprayed trees on M.IV.

4983. SPENCER, D. M., and WILKINSON, E. H.
Further experimental work on the control of *Gloeosporium* in the store.
Plant Path., 1960, **9**: 49-51, bibl. 1.

Treatment of the storage atmosphere in polythene tents with 2 : 4 : 5-(trichlorophenoxythio)trichloromethane at 0·1 g. per cu. ft. of air space markedly reduced rotting of apples. Concentrating the compound on the box liners or placing it near the apples gave no better results than uniform distribution in the store. [For earlier work, see *H.A.*, 28: 3497.]—Wye Coll.

4984. Pratella, G. C.
Alterazioni delle pere conservate. **(Diseases and disorders of stored pears.)**
Progr. agric., 1960, **6**: 470-1, illus.

Brief notes on scald, internal breakdown, cold injury, blue mould (*Penicillium expansum*) and grey mould (*Botrytis cinerea*), with recommendations for control.

4985. Tometorp, G., and Bjurman, B.
Transport-och lagringsförsök med körsbär. **(Transport and storage trials with sweet cherries.)** [English and Esperanto summaries about 1 p. each.]
Medd. Trädgårdsförs. Alnarp **126**, 1959, pp. 31, bibl. 6.

The cherries studied were picked at Rånna and sent to Alnarp, a journey of 403 km. lasting about 18 hours. At Alnarp the fruit was stored for 4–5 days or for 8 days, and it was kept either in a cellar at 18° C. or in a cold store at 5° C. Another sample of cherries was kept in a cellar at Rånna at 13° C. Different types of packing material and container were also compared. The trials were carried out over a 3-year period, and the differences between years far exceeded any other differences. Eight days' storage in a cellar, however, was too long under any conditions. Of 6 varieties compared as regards their suitability for transport and storage Heinrichs Riesen was the best.

Fruit processing.

(*See also* 4746, 4930.)

4986. Charley, V. L. S.
The utilisation of apples.
J. Sci. Food Agric., 1960, **11**: 177-80.

A review type précis of several papers dealing with the utilization of apples in Europe, the U.S.A. and Canada. Uses include juice, sauce, frozen and dehydrated products, cider and pectin.

4987. Ricci, C.
L'essiccazione artificiale delle pesche. **(The artificial drying of peaches.)**
Fruitticoltura, 1960, **22**: 235-9.

Suitable varieties of peach for drying are listed and the process is described.

SMALL FRUITS, VINES AND NUTS

Strawberries.

(*See also* 4652, 4654, 4738, 4816, 4817, 4830, 5004, 5147, 5228, 5234, 5252-5254, 6293, 6308, 6315, 6331.)

4988. Scott, D. H.
Strawberries of the future.
Amer. Fruit Gr, 1960, **80**(5): 30-4, illus.

Notes on 14 good strawberry varieties introduced in the U.S. since 1956.

4989. Kobel, F., and Schütz, F.
Neue Erdbeer- und Himbeersorten der Eidgenössischen Versuchsanstalt Wädenswil. **(New strawberry and raspberry varieties from the Federal Research Station at Wädenswil.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 249-53, illus.

The new strawberry variety Wädenswil 6, although of excellent quality, is not suitable for marketing. The raspberry varieties Eva 1 and 2 are recommended particularly for processing as frozen fruit.

4990. Girolami, L.
Ancora sulla fragola Souvenir de Charles Machiroux. **(More about the strawberry variety Souvenir de Charles Machiroux.)**
Frutticoltura, 1960, **22**: 179-80.

A description of its fruit and a recommendation for commercial cultivation in Italy.

4991. Wilcox, A. N.
Trumpeter, a new strawberry from the University of Minnesota.
Minn. Hort., 1960, **88**(1): 3, illus.

Exceptional appearance, firmness and keeping and freezing qualities, and resistance to fruit rots.

4992. Denisen, E. L.
Cyclone.
Ia Fm Sci., 1959, **14**: 393-4, illus.

A new strawberry variety [see *H.A.*, 30: 1803].

4993. Suzuki, I., and others.
The new strawberry variety "Takane". [Japanese, with English summary ½ p.]
Bull., Tôkai-Kinki agric. Exp. Stat., hort. Stat., 1959, No. 5, pp. 90-7, bibl. 4, illus.

This hybrid of Haikara and Fairfax is resistant to leaf spot and tolerant of winter drought conditions. It is a vigorous, highly productive variety, bearing medium to large, uniform, bright red berries with compact flesh of excellent quality.

4994. Jehn, A.
Trockenheitsresistenz der wichtigsten Erdbeersorten. **(The drought resistance of the most important strawberry varieties.)**
Rhein. Mschr. Obstb., 1959, **47**: 283-4, from abstr. in *Beerenobstschriftt.*, 1959, No. 17, p. 6.

In a wet season Senga Sengana produced only 7·9%

higher yields than Siletz, while in a dry summer the difference was 57·5%. Senga 188 and Mme Moutot grown in a heavy soil also withstood drought relatively well, but reports on Regina and Macherauch's Früherente were conflicting. Georg Soltwedel and Dir. Paul Wallbaum were very susceptible to heat and drought injury, and Senga 29 and Senga 54 were moderately susceptible.

4995. MATZNER, F.
Über den Vitamin-C-Gehalt in Erdbeeren (*Fragaria grandiflora* Ehrh.). **(The vitamin C content of strawberries.)**
Wiss. Z. Friedrich-Schiller-Univ. Jena, 1958/1959, **8**: 253-9, from abstr. in *Beerenobstschriftt.*, 1959, No. 17, p. 7.

Soltwedel had the highest vitamin C content of the strawberry varieties examined, averaging 94 mg. per 100 g. on a fresh weight basis and 817·5 mg. on a dry weight basis. The corresponding values for most of the other varieties ranged from 30 to 60 mg. and from 400 to 700 mg., respectively.

4996. NERI, M.
Osservazioni sull'epoca de piantagione del fragolone. **(Observations on the time for planting strawberries.)**
Frutticoltura, 1960, **22**: 261-2, illus.

Strawberry planting in the 1st week of August resulted in an average yield of 14,000 kg./ha. in the following season. Yields of 9,000, 5,000 and 2,500 kg./ha. were obtained by planting in the 3rd week of August, the 1st week of September, and during October or November, respectively. In rotations strawberries should not follow lucerne, nor should they be planted in old vineyard soils or between fruit trees on deep-cultivated soils. Suitable preceding crops are wheat, hemp, flax and maize.

4997. HENRIKSEN, A.
Kulturforsøg og gødningsforsøg med jordbaer. **(Cultural and manurial trials with strawberries.)**
Tidsskr. Planteavl, 1960, **63**: 856-83.

Trials with strawberries were carried out at four Danish Research Stations from 1929 to 1957. Data obtained on the following subjects are recorded: Soil reaction; rotation crops; date of planting and runner production; spacing and weed control; cutting back after the first harvest; culture for one and more years; and manurial trials. Moderate applications of fertilizer and stable manure proved superior to heavy applications for yield, quality and earliness.

4998. CARLSON, R. F., MOULTON, J. E., AND RAI, G. S.
Field control of strawberry runners in the fall with maleic hydrazide.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 622-8, bibl. 8, illus.

The number of late formed, unproductive runners on Robinson and Paymaster strawberries was reduced by treatment with MH at 1, 2 and 3 lb./50 gal./acre, slight chlorosis showing on the runner tips at the 3 lb. rate. On a sandy soil 1 lb./acre was effective, but 2 lb./acre were needed on a clay loam soil. Fruit size increased and the plant foliage was more vigorous on treated plants, but there was no significant increase in yields. MH (2–3 lb./acre) also effectively controlled a late summer infestation of purslane (*Portulaca oleracea*).

4999. KRAMER, S.
Die Anwendung von Plastfolien im Erdbeeranbau. (Vorläufige Mitteilung.) **(The application of plastic film in the cultivation of strawberries. Preliminary communication.)**
Dtsch. Gartenb., 1959, **6**: 325-6, illus.

Preliminary note on beneficial effects of covering the soil with black plastic film and plastic cloches.

5000. LYON, F. D.
Protector cuts berry losses.
Western Fruit Gr, 1959, **13**(11): 12, illus.

Strip mulching of strawberries using stiff waterproof sheets, perforated with ⅜ in. holes to facilitate drainage and with circular apertures for the plants.

5001. AZIMOV, R. A.
The effect of trace elements on the processes of synthesis and hydrolysis of sucrose in strawberries. [Russian.]
Dokl. Akad. Nauk UzbSSR. 1959, No. 5, pp. 43-5, bibl. 11.

During the developmental stage the hydrolysis of sucrose in the leaves predominates over its synthesis. Trace elements changed the activities in leaves and fruit as follows: B and Mn increased the hydrolysis of sucrose in the leaves but had the opposite effect in the fruit, thus resulting in increased yield and improved quality. Cu, Mo and B+Mo had an adverse effect on the synthesis of sucrose. It is suggested that Cu and Mo increase the intensity of respiration and the formation of substances which accelerate the ripening of the fruit. Zn alone or in combination with B resulted in the best yield and sugar content of the berries.

5002. REDIT, W. H., AND HAMER, A. A.
Precooling and shipping Louisiana strawberries.
Mktg Res. Rep. U.S. Dep. Agric. **358**, 1959, pp. 39, illus.

In express railway trucks precooling with ice and fans for 1½ to 5 hours was not normally sufficient to reduce the temperature throughout the consignment to the desired 40° F. Greater cooling in transit was obtained when salt was added to the dry ice prior to departure and at the first re-icing, but the amount of ice normally used (400–500 lb.) was not considered sufficient effectively to reduce transit deterioration. Cooling in lorries was not as fast as in express railway trucks, even with better than average equipment. Fruit in experimental fibre-board trays cooled as well as that in the standard wirebound crates.

5003. Dickinson, D., and Raven, T. W.
Sand in canned strawberries.
Analyst, 1960, **85**: 521-3, bibl. 1.

The results of a survey of canned strawberries, which took account of variety, soil type, field and cannery treatments, are presented. The average sand content was 60 p.p.m. Laying straw early in the season reduced the amount of sand on the fruit, and less sand was found on fruit grown on medium and medium-heavy loams.—Fruit Veg. Canning Quick Freez. Res. Ass., Chipping Campden.

Other small fruits.

(*See also* 4696, 4718, 4830, 4874, 4882, 4989, 5233, 5234, 5247-5251, 5318, 6318.)

5004. Stepanova, E. M.
Vitamins in fruits and berries. [Russian.]
Priroda, 1960, **49**(5): 96-8, illus.

Rose hips, black currants, mountain ash, sea buckthorn, strawberries, red and white currants and raspberries.

5005. Piper, B. M.
Systems of pruning Chinese gooseberries.
N.Z. J. Agric., 1960, **100**: 348-55, illus.

The growth and fruiting habits of the vine are discussed. Pruning systems include spur pruning, which is most suitable for pergola-trained vines. In this system each spur is cut back 3–5 times during the growing season, the first cut being made 3 or 4 buds beyond the last fruit with subsequent cuts leaving 1 or 2 buds beyond the preceding cut. When the final cut is made, only 1 or 2 buds are left. Vines grown on fences are usually pruned on a cane replacement system, which involves the removal of as much as possible of the framework during the winter months, replacing it with new canes produced during the preceding growing season.—Dep. Agric., Tauranga.

5006. Liegel, W.
Witterungseinflüsse auf den Ernteverlauf und auf die Ertragshöhe bei der Brombeersorte Theodor Reimers. (**The effect of weather on cropping and yield of the blackberry variety Theodor Reimers.**)
ErwObstb., 1960, **2**: 136-9, bibl. 9.

In continuation of an earlier study [see *H.A.*, 30: 3429] the author found that: (1) The date of the beginning of the harvest depends on the date of bud burst, which in its turn is largely determined by temperature. (2) There is a tendency for the plants to compensate by more intensive growth for any delays in development caused by retarded bud burst. (3) Differences in the microclimate cause some differences in the dates of the harvest. (4) The weather conditions prevailing shortly before the harvest seem to be of particular importance for the maturation process. (5) A relationship probably exists between the mean fruit weight and the amount of rainfall.—Inst. Obstb. Gemüseb., landwirtsch. Hochsch., Stuttgart-Hohenheim.

5007. Roelofsen, B.
De teelt van blauwe bessen in het oostelijk gedeelte van de Verenigde Staten van Amerika. (**The culture of blueberries in the eastern part of the U.S.A.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1960, **23**: 87-93, illus.

With some reference to the possibility of growing the crop in Holland.

5008. Noorderkempen.
Blauwe bessen (*Vaccinium corymbosum* en hybriden). (**Blueberries (*Vaccinium corymbosum* and hybrids).**)
A.R. Proefbedrijf der Noorderkempen, reprinted in *Cult. Hand.*, 1960, **26**: 162.

A brief preliminary report on cultural and variety trials with blueberries in Belgium. Yields are tabulated, but it is too early to draw any conclusions.

5009. Darrow, G. M.
Blueberry breeding: past, present, future.
Amer. hort. Mag., 1960, **39**: 14-33, bibl. 9, illus.

A review of work carried out since 1908.

5010. Merchant, C. H.
Cleaner blueberries would lower processing costs and improve the pack.
Me Fm Res., 1960, 7(4): 3-7, illus.

Selective picking and removal of trash in the field help to reduce costs.

5011. Stretch, A. W., and Davis, B. H.
Effect of temperature on post-harvest decay of blueberry varieties.
From abstr. in *Phytopathology*, 1960, **50**: 241.

Two early, 2 midseason and 2 late blueberry varieties were stored for 1 week at 80, 55, 42 and 32° F. Humidity in storage was 80% at 80° F. and about 50% at the other temperatures. Data on decay were taken prior to storage and after 1, 3, 5 and 7 days. The principal moulds found on decayed berries were *Alternaria*, *Botrytis* and *Gloeosporium* spp. No significant differences in decay were noted after 7 days at 80° F. in the early varieties Weymouth and Earliblue. Both varieties had about 77 and 43% of mouldy berries in 2 tests. Among midseason varieties Bluecrop showed 30 and 26%, and Rancocas 98 and 64% of mouldy berries in 2 tests. Approximately 28% of mouldy berries were noted in the late varieties Colville and

Jersey in one test, and 50 and 26%, respectively, in a second test. At 55° F. no differences were noted within the early and late varieties, but in the mid-season group Bluecrop had significantly fewer mouldy berries than Rancocas. Progressively fewer mouldy berries were noted in all the varieties at 55, 42 and 32° F. The use of pulp, veneer or plastic containers had no significant effect on the rate of fruit decay.

5012. Noorderkempen.
Rassenproef: zwarte bessen. **(Variety trial: black currants.)**
A.R. Proefbedrijf der Noorderkempen, reprinted in *Cult. Hand.*, 1960, **26**: 99.

A table shows yields, berry size and ease of picking of 7 varieties. Goliath gave the best all-round results.

5013. Anon.
Rassenproef: rode bessen. **(Variety trial: red currants.)**
Cult. Hand., 1960, **26**: 52, illus.

In a trial with young red currant bushes Laxton's No. 1, Fay's Prolific and Mach. Rote Spätlese proved very susceptible to wind damage. Duitse Rode and Hoornse Geelsteel produced a large number of very small bunches. Yield figures are presented, but as the plants had not come into full bearing no definite conclusions could be drawn. Rondom gave much higher yields when trained on wires than when grown as a bush.

5014. Grjuner, A. M.
The use of heteroauxin in the propagation of black currants. [Russian.]
Sadovodstvo, 1960, No. 3, p. 24.

Black currant cuttings taken in March were stored under snow, and before planting in a poor soil their lower ⅓ was immersed in 0·02% heteroauxin for 20–24 hours. Rooting and top growth were much better than in untreated controls, and 60% of the rooted cuttings were ready for planting out by the end of the season.

5015. Ulanov, R. F.
Black currant transplants in one growing season. [Russian.]
Sadovodstvo, 1960, No. 3, pp. 22-3, illus.

Cuttings, 16–18 cm. long and not less than 8 mm. in diameter, were taken from the middle of year-old shoots of 4–5-year-old black currant bushes, either when the bud scales were opening or when the leaves were showing, in which latter case all buds except the uppermost were removed. The cuttings were planted up to the top bud in well manured soil 20 cm. apart in rows 90 cm. apart. When 12 cm. high and already rooted they were cut back to induce branching, and by the autumn well shaped plants 70–80 cm. tall with a good root system were ready for planting out.

5016. Vanderbruggen, M.
Gevoeligheid van zwarte bessenrassen aan late lentenachtvorst. **(Susceptibility of black currant varieties to night frost damage in late spring.)**
Cult. Hand., 1960, **26**: 142-3.

The various factors affecting the susceptibility of black currant varieties to spring frost damage are discussed, and the merits of several varieties assessed.

5017. Englert, K.
Einfluss der Bodenbearbeitung und der Bodenpflege auf das Wachstum bei Beerenobst. **(The effect of soil cultivation on the growth of small fruits.)**
Obstb., 1960, **79**: 28, from abstr. in *Inform-Dienst Weihenstephan*, 1960, No. 4, p. 57.

Data illustrating the severe inhibition of growth resulting from deep cultivation of black and red currants.

5018. Indenko, I. F.
Foliar nutrition of black currants and the possibility of combining it with fungicidal treatments. [Russian, with English summary ½ p.]
Fiziol. Rast., 1960, **7**: 198-206, bibl. 17.

Under favourable conditions of soil and climate spraying with a 2% superphosphate + 0·5% urea solution after flowering reduced fruit drop, increased the weight of berries, improved quality and enhanced yields by 18% [see also *H.A.*, 30: 321]. The use of dinitrorodanbenzole as a fungicide in combination with the foliar nutrient treatment caused no alteration in the effectiveness of either the nutrient or the fungicide. When, however, burgundy or bordeaux mixtures were used in combination with P sprays, the effectiveness of the fungicides was reduced. P uptake by the leaves from the foliar spray, with or without dinitrorodanbenzole, was good [see also *H.A.*, 29: 1178]. When applied in combination with burgundy mixture P fixation was slight and P uptake high, whereas with 3% superphosphate + 1% bordeaux mixture P fixation was high and uptake low, although when the rate of P was doubled (6%) its uptake increased.

5019. Vitkovskij, V. L.
Differentiation of the growing points and development of the flower parts in mixed buds of currants. [Russian.]
Tr. prikl. Bot., Genet. i Selekc., 1957, 30(3): 248-52, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,476.

Buds of black, red and white currants were examined from July 15 to May 25 at 7–10 day intervals during the growing season and once a month in the winter. A description is given of 6 phases of differentiation of the flowers in mixed buds. The sequence of the differentiation and development of the flowers was very similar in all the currants, but the rate was different. Flower bud development took 288–293 days in the black currant, 290–304 in the red and 285 in the white currant. Differentiation started earlier in the early varieties. It also started earlier in the red than in the black and white currants.

5020. Rymaševskij, V. K., and Rymaševskaja, R. S.
The importance of nectar production in different varieties of top and soft fruit. [Russian.]
Agrobiologija, 1960, No. 1, p. 143.

Observations on 5 varieties of gooseberry and 5 varieties of black currant showed that more bees visited those varieties that produced nectar with a high sugar content. These were not necessarily the varieties producing the largest quantity of nectar. Gooseberry flowers produced sweeter nectar than those of black currant and were more frequently visited.

5021. Reichel, L., and Reichwald, W.
Über die Farbstoffe der schwarzen Johannisbeere. (**On the fruit pigments of the black currant.**)
Naturwissenschaften, 1960, **47**: 41, bibl. 3.

5022. Reichel, L., and Reichwald, W.
Über die Farbstoffe der schwarzen Holunderbeere. (**On the fruit pigments of the black elderberry.**)
Naturwissenschaften, 1960, **47**: 40-1, bibl. 1.

For earlier work see *H.A.*, 30: 3439.

5023. Avent, K. L.
Berry fruit growing in Victoria. 6. Bramble fruits.
J. Agric. Vict., 1960, **58**: 87-93, illus.

Culture of loganberries, boysenberries, youngberries and lawtonberries.

5024. Ministry of Agriculture, London.
The loganberry.
Adv. Leaf. Minist. Agric., Lond. **129**, revised 1960, pp. 7, illus.

Advice on growing the crop, including a spray schedule for cane spot and raspberry beetle control.

5025. Beakbane, A. B., and Labern, M. V.
The growth and cropping of five virus-tested clones of loganberry.
Exp. Hort., 1960, No. 3, pp. 37-41, bibl. 6.

See *H.A.*, 30: 3440.

5026. Rohrer, D. E., and Luh, B. S.
Composition and quality evaluation of boysenberries for frozen pies.
Food Technol., 1959, **13**: 645-9, bibl. 17, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-248.

The influence of harvest maturity on the contents of organic acid, sugar, tannin, pectin and volatile reducing substances is reported. Acidity decreased and soluble solids increased with ripening. The importance of harvest maturity and a proper balance of sweetness and acidity is discussed.

5027. Noorderkempen.
Rassen proef met frambozen. (**Raspberry variety trials.**)
A.R. Proefbedrijf der Noorderkempen 1957-58, reprinted in *Cult. Hand.*, 1960, **26**: 27-8.

Yield figures are presented for 22 varieties, and brief notes are given on the characteristics of a few of the more promising ones. Rode Radboud was outstanding for quality and the MR selection of this variety yielded very heavily.

5028. Szilágyi, K., and Kollányi, L.
E.401, az új málnafajta. (**E.401, a new raspberry variety.**) [Russian and German summaries $\frac{1}{3}$ p. each.]
Kisérl. Közlem., Sect. C, 1958 (issued 1959), **51C**(3): 79-83, bibl. 2, illus.

E.401, raised from Superlative × Lloyd George, is prolific, possesses a very good flavour and appearance and is suitable for both fresh consumption and processing.

5029. Anon.
Teeltproef—plantafstanden bij frambozen. (**Cultural trial—planting distances for raspberries.**)
Cult. Hand., 1960, **26**: 28.

Yield figures per plant and per acre are given for Malling Promise and Preussen raspberries in rows spaced 1·3, 1·6 and 1·9 m. apart (all at 0·5 m. in the row). Yield per plant of Malling Promise increased with the wider spacing, with the result that the yield per acre remained practically constant. With Preussen, however, yield per plant remained practically constant at all the row spacings. It is concluded that tall varieties should be planted in more widely spaced rows than short varieties.

5030. Noorderkempen.
Bemestingsproeven op frambozen. (**Manurial trials on raspberries.**)
A.R. Proefbedrijf der Noorderkempen 1957-58, reprinted in *Cult. Hand.*, 1960, **26**: 51.

In a 3-year fertilizer trial with the raspberry variety Rode Radboud no significant yield differences were observed as a result of various levels of N, P and K application. There was a tendency, however, for an increase in N level to reduce yields and for an increase in K level to improve them.

Vines—general.

(*See also* 4655, 6280, 6301, 6302.)

5031. Bradt, O. A.
The grape in Ontario.
Bull. Ont. Dep. Agric. **487**, revised 1959, pp. 43, illus.

Planting, management, varieties, pests and diseases.

5032. Christ, E. G.
Grape growing in New Jersey.
Ext. Bull. N.J. St. Univ. **330**, 1960, pp. 16, illus.

Advice on varieties, establishment and culture, including pruning.

5033. Dalmasso, G.
Viticoltura ed enologia nella Bulgaria d'oggi. **(Viticulture and enology in Bulgaria today.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 70-124, bibl. 11, illus.

The subjects discussed include area under vines, annual production of grapes, the five wine-growing districts, cultural methods including training and pruning (Guyot), and dessert and wine varieties. Notes are given in an appendix on the distribution, morphology and agrobiological characteristics of 7 varieties.

5034. Ragazzi, G.
Problemi tecnici ed economici della viticoltura ed enologia del Forlivese. **(Technical and economic problems of viticulture and enology in Forli.)**
Atti Acad. ital. Vite 1958, 1959, **10**: 270-91, illus.

Varieties, rootstocks, training, areas under vines.

5035. Vescia, M.
Il Lugana. Condizioni di produzione—indagini fisico-chimiche sul vino. **(The Lugano district. Conditions of [grape] production and physico-chemical investigations on the wine.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 529-67, bibl. 33, illus.

Soils, climate, area cultivated, varieties, rootstocks and harvesting.

5036. Cacciatore, M.
Contributo allo studio tecnico ed economico della viticoltura della provincia di Novara. **(A contribution to the technical and economic study of viticulture in the province of Novara.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 465-528, bibl. 6, illus.

Subjects discussed include areas under viticulture and cultural practices.

5037. Gerritsen, C. J.
Wijngaarden in Nederland? **(Vineyards in Holland?)** [English summary 15 lines.]
Meded. Dir. Tuinb., 1959, **22**: 688-91, bibl. 13, illus.

Preliminary observations are reported on trials on the outdoor culture of vines, started in 1952 at the Institute of Horticultural Plant Breeding, Wageningen. The results so far have not been very promising.

Vines—varieties

5038. Myrianthousis, T. S.
Vine introduction and vine variety collection.
Countryman, Nicosia, Feb. 1960, pp. 9-10.

Lists varieties in the Kondea collection in Cyprus.

5039. Cosmo, I.
Vitigni ad uve da vino per i futuri impianti delle Venezie, Emilia e Lombardia. **(Wine vine varieties for future planting in Venezia, Emilia and Lombardy.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 392-464, bibl. 2, illus.

5040. Dalmasso, G., Dell'Olio, G., and Delleani, E.
Avarengo. Doux d'Henry. Plassa. **(The vine varieties Avarengo, Doux d'Henry and Plassa.)**
Ann. Sper. agrar., 1959, **13**(6), Suppl. pp. CXCIX-CCVI, bibl. 7, illus., CCVII-CCXVI, bibl. 2, illus., CCXVII-CCXXIII, bibl. 3.

Black wine varieties.

5041. Bruni, B., Del Gaudio, S., and De Girolamo, S.
Bombino bianco. **(The vine variety Bombino bianco.)**
Ann. Sper. agrar., 1959, **13**(6), Suppl. pp. XXXVII-XLVI, bibl. 10. illus.

A white wine variety.

5042. Breviglieri, N., and Messerini, A.
Bonamico. **(The vine variety Bonamico.)**
Ann. Sper. agrar., 1960, **14**(2), Suppl. pp. CLXIII-CLXXI, bibl. 8, illus.

A dark wine grape.

5043. Prosperi, V., Pirovano, A., and Bruni, B.
Cesanesi. Bellone. **(The vine varieties Cesanesi and Bellone.)**
Ann. Sper. agrar., 1960, **14**(2), Suppl. pp. CLXXIII-CLXXXVII, bibl. 10, and CLXXXIX-CXCV, bibl. 7, both illus.

Both are wine grapes, the first, of which there are two forms, being black, the second white.

5044. Dalmasso, G., Dell'Olio, G., and Bertola, G.
Erbaluce. **(The vine variety Erbaluce.)**
Ann. Sper. agrar., 1959, **13**(6), Suppl. pp. XLVII-LVI, bibl. 15, illus.

A white wine variety.

5045. Breviglieri, N., and Casini, E.
Mammolo. Biancone de Portoferraio. **(The vine varieties Mammolo and Biancone di Portoferraio.)**
Ann. Sper. agrar., 1960, **14**(2), Suppl. pp. CXLI-CLI, bibl. 20, and CLIII-CLXI, bibl. 7, both illus.

Wine varieties, the first with reddish fruit, the second with white.

5046. COSMO, I., AND FORTI, R.
Marzemino. (**The vine variety Marzemino.**)
Ann. Sper. agrar., 1960, **14**(2), Suppl. pp. CXXIX-CXXXIX, bibl. 7, illus.

A black wine grape.

5047. CASTAGNOLA, C.
Studio ampelografico, tecnologico ed enochimico del Merlot nel canton Ticino. (**An ampelographic, technological and enochemical study of the Merlot vine in the Ticino canton.**)
Atti Accad. ital. Vite 1958, 1959, **10**: 568-613, bibl. 30, illus.

5048. BRUNI, B.
Vesprino. Empibotte bianco. Maiolica. Sagrantino. (**The vine varieties Vesprino, Empibotte bianco, Maiolica and Sagrantino.**)
Ann. Sper. agrar., 1959, **13**(6), Suppl. pp. I-X, bibl. 3, illus., XI-XVII, bibl. 4, illus., XIX-XXVI, bibl. 3, illus., XXVII-XXXV, bibl. 6, illus.

Descriptions of 2 white and 2 black wine varieties.

Vines—propagation and rootstocks.

(*See also* 5076, 5079, 5084.)

5049. MYRIANTHOUSIS, T. S.
Vine propagation and training.
Countryman, Nicosia, March-April 1960, pp. 16–18.

Recommendations for Cyprus conditions.

5050. FILIPPENKO, I. M.
How to advance fruiting in vine seedlings. [Russian.]
Sadovodstvo, 1960, No. 4, pp. 38-40, illus.

Seedlings raised in sod blocks or paper pots under glass, planted out after late frosts, amply nourished and carefully pruned and trained, began to fruit in their 2nd or 3rd year.

5051. GUZUN, N. I.
The effect of the quality of vine scion wood on the output of grafted planting material. [Russian.]
Vinodelie i Vinogradarstvo, 1960, **20**(2): 35-8, bibl. 1.

Shoots from different parts of the mother plant were shown to differ in the levels of catalase activity and the contents of chlorophyll and carbohydrates in their leaves. The yield of top quality grafts and the quantity of roots on the young plants varied with the type of shoot used as graftwood. The shoots which had the highest chlorophyll content and which gave the highest percentage of first quality transplants were those taken from the replacement branches and from the middle sections of fruiting wood.

5052. KOLESNIK, L. V.
The effect of humic acid on vines. [Russian.]
Gumin. Udobrenia, Har'kov, 1957, pp. 289-302, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,164.

In grafted vine cuttings dipped in 0·0012% sodium humate, or watered with the solution at 10 l. per metre row in the nursery, root formation, callusing and the graft union were improved, and the catalase activity and chlorophyll content of the leaves were increased. As a result a larger proportion of high quality transplants was obtained [see also *H.A.*, 30: 3462]. The treatment was most effective when 2 applications were made, one at the time of stratification of the grafts and the other when planting out in the nursery.

5053. LELAKIS, P. L.
Dormant-bud grafting of vines. [Greek, with French summary 16 lines.]
Reprint from *Deltion agrotikes Trapezes*, Nov.-Dec. 1959, No. 111, pp. 3, bibl. 2, illus.

The technique is described and illustrated, and the advantages of this method over that in which active buds are used are discussed.

5054. STEFANESCU, G., AND OTHERS.
Cele mai potrivite distanţe de plantare a viţelor portaltoi in podgoria Drăgăşani. (**Optimum planting distances for vine rootstocks in the Dragashani vineyard.** [English, French, German and Russian summaries, ¾ p. each.]
Grăd. Via Liv., 1960, No. 2, pp. 17-19 + summaries.

Although the highest number of cuttings per ha. of Berlandieri × Riparia Kober 5 BB was obtained with a planting distance of 1 × 1 m., a spacing of 1·5 × 1·5 m. is recommended as the most economical. This provides 150,000 cuttings per ha. from 3,950 plants and can be cultivated with a small tractor.

5055. VLADU, C.
Răspindirea systemului radicular la viţă in funcţie de distanţa de plantare şi portaltoi in podgoria Drăgăşani. (**The influence of planting distance and rootstocks on the spread of vine root systems in the Dragashani vineyard.**) [English, French, German and Russian summaries ½ p. each.]
Grăd. Via Liv., 1960, No. 2, pp. 24-8 + summaries, illus.

In rootstock and spacing experiments, using Pinot noir as the scion, the stock Riparia × Rupestris 101–14 was the most affected by planting distance and Kober 5BB the least. Most of the root systems developed to a depth of 20–40 cm., and this was not influenced by spacing. Yields were markedly dependent on root growth.

5056. ROCHE, R.
Problèmes techniques posés par la reconstitution des vignobles autochtones au Maroc. (**Technical problems raised in the restoration of native vineyards in Morocco.**)
Progr. agric. viţic., 1960, **153**: 239-43, 259-62.

Suitable rootstocks, grafting methods, scion selection, planting, and management of young vines are discussed.

5057. CALDAROLA, C.
Contributo alla conoscenza dell'influenza del portainnesto sull'accumulo di sostanze di riserva in *Vitis vinifera* cv. "Regina". **(A contribution to the knowledge of the effect of the rootstock on the accumulation of reserve substances in *Vitis vinifera* var. Regina.)** [English summary 12 lines.]
Ann. Sper. agrar., 1959, **13**: 1097-110, bibl. 10.

The N, P and K contents of dormant shoots of scions grafted on 9 different rootstocks were not significantly different.—Staz. agrar. sper., Bari.

5058. LELAKIS, P. I.
The triple-origin rootstock 44-53 Malègue (Riparia-Rupestris-Cordifolia). [Greek, with French summary 10 lines.]
Reprint from *Deltion agrotikes Trapezes*, Jan. 1960, No. 112, pp. 10, bibl. 7.

This vine rootstock, which is highly resistant to drought, and probably to infectious degeneration, is recommended for use in re-establishing vineyards seriously attacked by phylloxera on the non-calcareous soils of Attica.

Vines—growth, reproduction and physiology.

(*See also* 6311.)

5059. ALLEVEL'DT, G.
Influence of day length on the growth of different vine varieties. [Russian.]
Agrobiologija, 1960, No. 1, pp. 57-62, illus.

Reduced day length inhibited the growth of the 5 varieties tested and induced the formation of axillary buds. Clone 90 of the Riesling variety and one interspecific hybrid were inhibited less than the others. The bursting of axillary buds was retarded by short-day treatment. IAA and GA treatments did not alter the effect of short days. [See also *H.A.*, 29: 3359.]

5060. TAWFEEK MOUSTAFÁ, A.
Indices foliares de producción en el viñedo. **(Foliar indices of production in vineyards.)**
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 311-22.

Measurements made on the varieties Malbeck and Aramon comprised the average areas of the 5th, 6th and 7th leaves from the base of the primary fruiting shoots in September, the average length and weight of the lignified shoots, and the weight of fruit per plant. In both varieties the only significant correlation was that between the area of the 6th leaf and the length of the lignified shoots.—Centro Ampelogr. Vitic., Madrid.

5061. NEGRUL', A. M.
The evolution of the size of seeds and berries in vines. [Russian, with French summary $\frac{1}{3}$ p.]
Izv. Timirjazev. sel'sk. Akad., 1960, No. 2, pp. 167-76, bibl. 22, illus.

A positive correlation found between the size of the seed and that of the berry in wild forms and different eco-geological types of *Vitis vinifera* made it possible to trace the development of berry size in cultivars through seeds discovered in archeological investigations in the Crimea, Central Asia and Transcaucasia.

5062. KAMEL, A.
Estudio sobre la sexualidad de las uvas de mesa en España. **(A study on the sexuality of dessert grape vines in Spain.)**
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 331-47, bibl. 15, illus.

For the 96 vine varieties studied data are presented on: the functional class of flower, i.e. male, female, fully hermaphrodite, or hermaphrodite with the appearance of maleness; pollen fertility; flower structure; fruit colour, flavour and ripening time; bunch shape and size; and seed size. The variety Japinkay showed a high percentage of self-pollination, rare in vines.—Centro Ampelogr. Vitic., Madrid.

5063. CARLONE, R.
Indagine sulla fertilità del vitigno Ohanez in Puglia. **(Investigations on the fertility of the Ohanez vine variety in Apulia.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 241-63, bibl. 18, illus.

The Ohanez variety has predominantly female flowers and infertile pollen. Cross-fertilization can be carried out with pollen from several local varieties but is made difficult by the persistence of the calyptra, particularly when the weather is wet or cold during flowering. Notes are given on the culture of the variety in Apulia.—Ist. Colt. arb., Univ. Torino.

5064. MALAN, A. H.
The struggle against seedless berries in Waltham Cross grapes.
Dec. Fruit Gr, 1960, **10**: 139-40, illus.

Factors causing the formation of seedless berries and cultural practices aimed at reducing their number.

5065. MARRO, M.
Sviluppo partenocarpico nel trebbiano trattato con gibberellina. **(Parthenocarpy in the vine variety Trebbiano treated with gibberellin.)** [French summary $\frac{1}{4}$ p.]
Frutticoltura, 1960, **22**: 123-6, bibl. 9.

A mixture of gibberellic acid and gibberellin A was sprayed at 100 p.p.m. alternately on opposite sides of the trellising, so that each vine was treated on one side only, at the beginning of flowering. A thinning effect, due to retarded development of some of the grapes in the treated bunches, and not to any extra elongation of bunch or fruit stalks, was first observed 15–20 days after flowering. The treated bunches were of lighter weight than those untreated, and being less compact were not so severely infected by *Botrytis cinerea*. The total number of grapes, normal and dwarfed, per bunch, was significantly higher in the treated bunches, but the proportion of dwarf berries was considerably higher. Treatment increased the percentage of full sized seedless grapes from 1·5 to 51, and the small fruits were all seedless. [It would seem that in two tables supporting the text the captions "treated" and "untreated" should be reversed.—Ed.]—Staz. sper. Ortofruttic., Milano.

5066. Bukovac, M. J., Larsen, R. P., and Bell, H. K.
Effect of gibberellin on berry set and development of Concord grapes.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 503-10, bibl. 17.

Fresh and dry weights, number of berries per cluster and percent soluble solids in 4–5-year-old vines were not affected by GA (0,10,25 or 100 p.p.m.) applied at or after full bloom. However, in 4 older commercial vineyards a foliar application of 100 p.p.m. GA, made 11 days after full bloom, resulted in an increase of 0·2–0·9 kg. in the fresh weight of 25 basal clusters and in the setting of approximately 16% more berries per cluster. Percent soluble solids and the growth curve of the berries were not significantly changed by the application of GA.

5067. Dahling, R.
Gibberellin versatile in the vineyard.
Western Fruit Gr, 1959, **13**(10): 17-18, illus.

Pre-bloom applications of GA resulted in loosening of the clusters, thus reducing the risk of bunch rot, in the following varieties: Palomino and Carignane when used at 2·5 p.p.m. and Grenache and Alicante Bouschet when used at 20 p.p.m. Clusters of seeded table grapes were not loosened by applications of GA, straggly clusters and shot berries being produced. Treatment of Thompson Seedless with GA at 15 p.p.m. produced a larger berry for shipping. A good berry set was induced on Zante Currant by GA at 2 p.p.m.

5068. Stoev, K. D., Mamarov, P. T., and Benčev, I. B.
Sugars and free amino acids during fruit ripening and dormancy of vines. [Russian, with English summary ½ p.]
Fiziol. Rast., 1960, **7**: 145-50, bibl. 28, illus.

For another account, see first part of *H.A.*, 30: 1858.

Vines—pruning.

(*See also* 5049.)

5069. Melkonjan, A. S.
The interrelationship between the aerial and underground parts of the vine during the first year of planting. [Russian.]
Bjull. nauč.-tehn. Inf. Arm. n.-i. In-ta Vinogradarst., Vinodel. i Plodovodst., 1957, No. 1, pp. 9–12, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,146.

During the first year vine roots produced more linear growth than the shoots and showed strong branching, which resulted in good water and nutrient uptake. The best method of pruning was by cutting back to 3 shoots with 2–3 buds each; this resulted in 4 times the total growth, twice the number of leaves and better developed roots than cutting back to 1 shoot with 2–3 buds.

5070. Pisahov, Š. M.
The relationship between the number of fruiting shoots per vine, yield and wine quality. [Russian.]
Vinodelie i Vinogradarstvo, 1960, **20**(2): 29-34.

Vines were pruned to leave different numbers of fruiting shoots. Above a certain number of shoots per vine the total yield per vine, average bunch weight, shoot growth and sugar content of the grapes decreased, but acidity of the grapes increased. The optimum shoot number varied with the variety, age of vine and growing conditions.

5071. Nikiforova, L. T.
The effect of leaf area on the yield of vines. [Russian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1957, No. 1, pp. 27-9, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,150.

Removal of the majority of leaves (retaining on each shoot 1–5 leaves above the bunch) retarded the growth and ripening of the grapes, the ripening of the wood and, in subsequent years, bud burst. When 6–7 leaves were retained on each shoot these effects were less marked, and with 10–11 leaves growth was unaffected. The removal of 65% or more of the leaf area greatly increased the size and thickness of the remaining leaves; these showed an increased rate of assimilation, but this could not compensate for the over-all deficiency of assimilates. When, however, 5 leaves above the bunch and all the leaves below it were retained, photosynthetic activity increased, with the result that higher yields were obtained.

5072. Vega, J., and Mavrich, E. P.
Efectos fisiológicos de la poda herbácea en vid. (**Physiological effects of summer pruning vines.**)
Rev. Invest. agríc. B. Aires, 1959, **13**: 183-206, bibl. 13, illus.

Six grades of summer pruning, ranging from light to severe, were compared in a 4-year trial on Guyot-double-trained Malbeck vines. Summer pruning had a debilitating effect, which (1) was directly related to its intensity, (2) was more severe the later pruning took place in the growing season, (3) became marked in the 3rd consecutive year, and (4) reduced fruit and shoot production.—Estac. exp. Agropec., Mendoza.

Vines—soil management and nutrition.

(*See also* 4691, 4701, 5255-5257.)

5073. Decker, D., Alcalde, A. J., and Cinta, W.
Mécanisation rationelle de la plantation et de la culture de la vigne. Rapports nationaux. **(Rational mechanization of vine planting and cultivation. National reports.)**
Bull. Off. int. Vin, 1960, **33**(352): 7-22.

Recent developments in Germany and Argentina.

5074. Walter, B.
Die Eigenschaften von Weinbergsböden unter chlorotischen Beständen. **(The soil properties of chlorotic vineyards.)**
Weinberg u. Keller, 1960, **7**: 151-71, bibl. 11.

A combination of low porosity, high CO$_2$ and high water holding capacity.

5075. Branas, J.
Chloroses par sécheresse. **(Cases of chlorosis induced by drought.)**
Progr. agric. vitic., 1960, **153**: 311-13.

Drought in April and May, following a very wet March, produced intense chlorosis in many young vines, including those on lime-resistant rootstocks, and also in older vines with superficial root systems, despite the fact that the lime content of the soil was lowest in the upper layer. The effect is largely attributed to leaching of soil N prior to the drought and to accumulation of cations in the surface layers.

5076. Casini, E.
Prove di rinnovazione di vecchi impianti viticoli. Secondo contributo. **(Trials on the rejuvenation of old vineyards. Second contribution.)**
Atti Accad. ital. Vite 1958, 1959, **10**: 168-90, bibl. 9.

In a 2-year trial rejuvenation of 30-year-old vines on American rootstocks was achieved in 677 out of 789 cases by grafting on suckers from the rootstocks. In the third year the production of the rejuvenated vines, which had received organic manure and 3 cultivations in each of the 2 preceding years, was 1·25–1·63 kg. per plant compared with 1·2–1·57 kg. per unrejuvenated plant that had received the same treatment. The corresponding figures for rejuvenated and unrejuvenated vines that had received no manure and 3 cultivations were 1·13–1·16 and 1·0–1·1 kg. per plant, respectively. The figures for vines that had received no manure and 2 cultivations were 1·23–1·24 and 1·0–1·1 kg. per plant, respectively. It was concluded that old vines on American rootstocks can be rejuvenated successfully in this way, and that lack of suitable and timely cultivations is often a major factor in the early deterioration of such plants, deterioration which is often wrongly ascribed solely to the American rootstocks.—Ist. Colt. arb., Univ. Firenze.

5077. Herschler, A.
Beiträge zur Humusfrage im Weinbau. **(On the humus problem in viticulture.)**
Weinberg u. Keller, 1960, **7**: 35-44, bibl. 5.

The results of a recent survey compared with those of a survey made some 30 years ago show that the humus content of the soil has increased in the vineyards of the Moselle area. Current methods of supplying organic matter were found to be adequate, in spite of considerable reductions in the application of stable manure.

5078. Băjescu, N., and Alexandrescu, I.
Aplicarea îngrăsămintelor în cultura viţei de vie. **(Applying chemical fertilizers in the vineyard.)** [English, French, Russian and German summaries, ½ p. each.]
Grăd. Via Liv., 1959, **8**(11): 28-31 + summaries.

Experiments on Pinot gris vines grafted on Chasselas × Berlandieri 41B showed that, on light chestnut steppe soils, or on chestnut or chocolate chernozems, a basic dressing of manure at 30 tons/ha. should be followed by annual dressings of 150–200 kg./ha. N, 300 kg./ha. P$_2$O$_5$ and 100 kg./ha. K$_2$O. [See also *H.A.*, 28: 3438.]

5079. Wainstein, P., and Abitbol, J.
La alimentación mineral de la vid. Características de algunas variedades europeas y portainjertos reveladas por el diagnóstico foliar. **(Mineral nutrition of vines. Characteristics of some European varieties and rootstocks as shown by foliar diagnosis.)**
Rev. Invest. agríc. B. Aires, 1959, **13**: 303-20, bibl. 1.

In studies covering 3 years the annual uptake of N + P + K was generally higher in the 5 rootstocks than in the 7 wine varieties studied, but during the early stages of fruit ripening the position was reversed. Graphs show separate and combined uptake. Seasonal variation was wider in rootstocks than in varieties, and wider in young than in mature plants. Uptake of P was high in the rootstock Berlandieri × Riparia 420-A and in the variety Malbeck. The total nutritional requirements of Dattier de Beyrouth were low. Some degree of affinity in nutrient requirements was evident between this variety and the rootstock Riparia × Rupestris 101–14, and between Malbeck and the rootstock 420-A.

5080. McVickar, M. M.
Complex fertilizers tested on grapes.
Western Fruit Gr, 1959, **13**(11): 11.

During a 4-year trial period the best results in terms of cover crop growth, plant growth and health, crop yield and net profit per unit of cost were obtained with a pelletized 14-14-14 fertilizer mixture. NPK was superior to NP, and NP to N alone.

5081. Gärtel, W.
Kaliummangel in Neuanlagen auf den Böden der unteren Diluvialterrasse des Moseltals. (**Potassium deficiency in new vineyards on soils of the lower diluvial terrace in the Moselle Valley.**)
Reprint from *Dtsch. Weinb.*, 1959, **14**: 717-22, bibl. 13, illus.

On the symptoms of potassium deficiency and corrective manurial treatments [see also *H.A.*, 29: 220 and 30: 3483].

5082. Dobroljubskij, O. K.
Cobalt microfertilizers. [Russian.]
Sadovodstvo, 1960, No. 3, pp. 38-9.

At the beginning of full bloom 2 litres of a solution containing 0·001 to 0·5 g. cobalt sulphate were applied to the soil around each vine. Averaged over 7 years, the weight of berries was increased by 20% and the sugar content by 1·22%, titrable acidity was reduced by 1·52% and maturity was advanced by 5-7 days. The maximum effect was obtained with 0·05 g. $CoSO_4$ per plant or 150 g. per ha.

Vines—grape quality and composition.

(*See also* 5183.)

5083. Katar'jan, T. G., and Hil'kevič, I. N.
The cultural conditions of vines in relation to fruit quality. [Russian.]
Vinodelie i Vinogradarstvo, 1960, **20**(2): 25-8.

The effects of cultural factors, such as date of picking, density of planting and type of pruning, on the sugar content, acidity and size of fruit of different varieties of vines are tabulated and discussed. The importance of selecting varieties suited to local conditions, or of adapting conditions to suit varieties, is emphasized.

5084. Del Gaudio, S., and Vessia, R.
Ricerche volumetriche, ponderali e glucometriche su bacche di *Vitis vinifera* var. Regina. (**Investigations on the size, weight and sugar content of Regina grapes.**) [English summary ½ p.]
Nuovo G. bot. ital., 1959, **66**: 265-88, bibl. 8, illus.

Investigations on the Regina variety growing on several rootstocks led to the following conclusions: (1) To obtain the largest and heaviest grapes in irrigated culture fruit thinning should be lighter in the basal and middle portions than in the apical portion of the bunch. (2) To obtain the highest sugar content thinning should be lighter in the apical portion. (3) With a supplementary irrigation in July fruit size increased in the lateral portion of the bunch, but the sugar content increased in the central, and decreased in the lateral, portion. (4) Grape size was largest with the rootstock Berl. × Rup. 1045P, and the sugar content was highest with Berl. × Rup. 140R; the sugar/weight ratio was highest with 140R in irrigated culture and with 779P in unirrigated culture. (5) A negative correlation between transverse diameter and sugar % indicated a centrifugal and longitudinal trend in sugar accumulation; in irrigated culture sugar accumulated most in the fruit apex and the apical portion of the bunch.—Staz. agrar. sper., Bari.

5085. Gallay, R., Leyvraz, H., and Simon, J.-L.
Influence de la charge de raisins sur la qualité de la vendange. (**The effect of grape yield on vintage quality.**)
Rev. romande Agric. Vitic., 1960, **16**: 48-51.

In trials with the variety Gamay de Caudoz in 1958 and 1959, in which bunches were removed to vary the yield of grapes and must, it was found that if production exceeded 1 litre of must per sq. m. of vineyard the wine would only be of good quality in the best vineyards and in climatically favourable years.—Stats. féd. Essais agric., Lausanne.

5086. Lamazou-Betbeder, M., and Pech, R.
Observations sur la maturité d'un raisin de table. (**Observations on the maturity of a table grape**).
Ann. tech. agric. Sér. E, 1957, **6**: 293-5, from abstr. in *Amer. J. Enol. Vitic.*, 1960, **11**: 47.

Studies of berry weight, sugar content and acidity of the variety Chasselas Doré de Moissac have indicated that the date of maturity (for processing) may be determined 10-15 days in advance of harvest when the berries reach their maximum weight and the sugar/acid ratio is 35. The latter should be 25 for eating maturity.

5087. Astegiano, V., and Graziano, M. T.
Sulla presenza di saccarosio nell'uva. (**The presence of sucrose in grapes.**)
Atti Accad. ital. Vite 1958, 1959, **10**: 614-20, bibl. 13.

Chromatographic analysis revealed the presence of 3·5–4·0% sucrose in mature and immature grapes of 14 varieties.—Staz. enol. sper., Asti.

5088. Garoglio, P. G.
Ricerche di laboratorio sull'influenza dei trattamenti acuprici al vigneto, nei riguardi della fermentazione dei mosti e della genuinità dei vini. (**Laboratory studies on the effects of non-copper fungicidal treatments of vines on the fermentation of musts and the purity of wines.**)
Riv. Vitic. Enol., 1960, **13**: 143-50, bibl. 3.

Fermentation of must was inhibited by the presence of captan residues, but not by zineb. The decomposition products of zineb were quite distinct from D_3, a fermentation inhibitor prohibited in Italian wines.

Vines—grape handling, storage and drying.

(*See also* 4738.)

5089. NELSON, K. E.
Post-harvest handling and storage of table grapes in California.
Dec. Fruit Gr, 1960, **10**: 68-74, illus.

Methods of packing in the vineyard and in the shed, grading, fumigation with SO_2, precooling, cold storage, transport and packaging.

5090. RYALL, A. L., AND HARVEY, J. M.
The cold storage of vinifera table grapes.
Agric. Handb. U.S. Dep. Agric. **159**, 1959, pp. 46, bibl. 79, illus.

Data derived from 30 years of study and experience are given on temperature, humidity, air movement, design of stores, fumigation and storage disorders.

5091. PARISI, B., AND SERINI, G.
Prove di conservazione di uva Regina e Italia. **(Storage tests with the grape varieties Regina and Italia.)** [English summary ½p.]
Ann. Sper. agrar., 1960, **14**(1), Suppl. pp. I-XIII, bibl. 8.

Storage under the Gasconserv system for 3 months prevented the development of moulds, and, except for some browning of the stalks after 1 month and slight shrinking of the fruit in the 3rd month, the grapes were in excellent condition and their flavour was practically perfect. In this system the temperature is maintained at 13·0–13·5° C. and the R.H. at 82–87%, with an atmospheric composition of 7% oxygen and 93% nitrogen. Refrigeration (0·5–1·5° C.) and a R.H. of 85–90%, with or without a high carbon dioxide atmosphere and a 2-hour ultra-violet irradiation daily, did not prevent mould development. Storage at 11·5° C. in an atmosphere of 16% oxygen and 84% nitrogen at a R.H. of 80–85% controlled moulds but caused excessive dehydration of the fruit.—Staz. sper. Freddo, Milan.

092. HIDALGO, L., AND CANDELA, M. R.
Pasificación de uvas sin pepita. **(The drying of seedless grapes.)** [French and English summaries ½ p. each.]
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 219-69, bibl. 54, illus.

Methods and machinery for obtaining seedless raisins are described, including the growing of seedless grape varieties, the induction of parthenocarpy and the mechanical extraction of seeds. The effects of different methods of drying, with and without soda treatment and bleaching, on the flavour, texture, and colour of raisins and sultanas are compared.—Centro Ampelogr. Vitic., Madrid.

5093. MATTHEE, F. N., AND OLIVIER, O. J.
Rain-damaged dried fruit requires special washing agents.
Fmg S. Afr., 1960, **35**(12): 17-20, illus.

Badly damaged samples of currants washed in each of 3 washing agents were compared, using sterile water as a control. The solutions used were Uniflex 2% by weight, and Teepol and Polagric both 0·2% by volume, all at 20° C. Uniflex and Polagric were both very effective in removing fungal spores, and all 3 agents were equally effective in improving the appearance of the fruit.

Temperate nuts.

(*See also* 4663, 4691, 4863.)

5094. MOORE, R. C., AND JUDKINS, W. P.
Nut trees for home planting.
Bull. Va polytech. Inst. agric. Ext. Serv. **227**, revised 1959, pp. 12, illus.

Varieties, planting, culture, production and harvesting of walnuts, pecans, Chinese chestnuts and filberts.

5095. WELLS, A. W., AND BARBER, H. R.
Extending the market life of packaged shelled nuts.
Mktg Res. Rep. U.S. Dep. Agric. **329**, 1959, pp. 14, bibl. 14, illus.

Walnuts, pecans and filberts stored in transparent film packages became stale and dark in colour in 3 or 4 weeks under temperature and light conditions similar to those encountered during marketing, unless protected from light and oxygen or treated with antioxidants. The shelf life of shelled walnuts, pecans and filberts was measurably lengthened by storage in nitrogen. Differences in the colour and flavour of walnuts and pecans stored in air and of those stored in nitrogen became apparent during the first 4 weeks of storage at 75° F. After 25 weeks those held in nitrogen were still in a saleable condition, whereas those in air were stale or rancid and dark coloured. Shelled walnuts and pecans stored in the light became dark coloured and rancid more rapidly than those held in darkness. Moisture contents in the kernels higher than about 2·5% caused an increase in the rate of rancidity development but had no effect on the rate of discoloration. Antioxidants extended the shelf life of shelled nuts by delaying the onset of rancidity. After 8 or 10 weeks' storage at 70° to 75° F. nuts treated with antioxidants were in good condition, whereas untreated nuts had begun to deteriorate. Walnuts and pecans subjected to gamma radiation at or above 5 × 10^4 r.e.p. developed very objectionable odours and flavours. This was evident immediately after treatment and did not become noticeably worse after storage for 30 days at 75° F. Shelled macadamia nuts, containing 3·3% moisture and packaged in polyvinyl chloride bags, retained excellent quality for more than a year at 32° or 38° F. Those held at 50° were saleable, but the flavour was not equal to that of nuts stored at the lower temperatures. Pistachio nuts were very stable; when stored at 75° F. in air for 20 months they did not become rancid. There was no significant difference in quality between those held at 75° and those held in cold storage at either 32° or 38°. [From authors' summary.]

5096. Graves, A. H.
Some outstanding new chestnut hybrids. I.
Bull. Torrey bot. Cl., 1960, **87**: 192-204, bibl. 19, illus.

The variety Essate-Jap is early ripening with some frost susceptibility in the seedling stage but hardy when fully grown. Sleeping Giant is blight resistant but is a late ripener and shy bearer, thus being most suitable as an ornamental. Kelsey is extremely blight resistant, bearing small nuts of excellent flavour and is recommended for nut orchards.—Conn. agric. Exp. Stat., New Haven.

5097. Urquijo Landaluce, P.
Las auxinas de enraizamiento en la multiplicación vegetativa del castaño. **(Root-inducing auxins in the vegetative propagation of chestnuts.)**
An. Inst. nac. Invest. agron. Madrid, 1959, **8**: 847-61.

Native Spanish chestnuts were easily propagated by layering, with the aid of growth substances, but ringing with raffia, and more particularly with wire, reduced the percentage of rooting. Success with hybrids was very limited in most clones, and there was no advantage in such cases in increasing the growth-substance concentration. The most satisfactory of numerous lanolin mixtures were those containing 0·5% NAA plus 0·5% IBA plus either 0·07% 2,4-D or 0·05% 2,4-D sodium salt. Neither pollen extracts nor vitamin B_1 increased rooting. Treatment dates between early May and mid-July gave equal results. The rooting of cuttings was achieved, after 14 years of failure, by early July treatment with a dry mixture of 0·5% each of NAA and IBA + 0·05% of 2,4-D sodium salt in talc, or by immersion for 10-20 sec. in a 50% alcoholic solution of 1% IBA. The cuttings were kept under intermittent mist during the daytime. In both sand and soil media rooting was improved by the addition of vermiculite. Although the rooted cuttings did not survive, owing to the fleshiness of the roots, the fact that they rooted is important, and further experiments will aim at the production of fibrous roots on such cuttings.

5098. Capucci, C.
Il nocciuolo nell'Appennino emiliano. **(Hazel nut growing in the Apennine region of Emilia.)**
Progr. agric., 1960, **6**: 446-58, bibl. 1, illus.

The account covers climatic and soil requirements, varieties, pollination, propagation, spacing, pruning and training, desuckering, cover cropping, manuring and soil cultivation.

5099. Romisondo, P.
La coltura del nocciuolo in Piemonte. **(Hazel nut growing in Piedmont.)** [French summary ⅓ p.]
Frutticoltura, 1960, **22**: 127-35, illus.

Mainly bush forms, grown from 3-4 suckers, sometimes interplanted with peaches.

5100. Joubert, A. J.
Adaptability of the pecan nut in South Africa.
Fmg S. Afr., 1960, **36**(1): 9-10.

Varieties classified and suitable growing regions indicated.

5101. Brison, F. R., and others.
Improved grades and consumer demand for in-shell pecans.
Bull. Texas agric. Exp. Stat. **932,** 1959, pp. 14, bibl. 4, illus.

Success, Desirable, Schley and Burkett grown in Texas were much superior in kernel percentage, external appearance and kernel quality to the in-shell pecans usually sold in Texas retail stores.

5102. Ten'kovceva, E. S.
The biology of flowering and fruiting in pistachio. [Russian.]
Bjull. nauč.-tehn. Inf. Tadž.n.-i. In-t. Sadovod., Vinogradst. i subtrop. Kul'tur, 1957, No. 1, pp. 61-6, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,472.

Flower bud differentiation in both male and female pistachio trees began at the end of April in the year preceding flowering and coincided with shoot and leaf growth. The stigma was found to remain receptive to pollen for 4-5 days, but the best time for pollination was the third day. The life of the male flower was one, sometimes two, days. Flower drop was high, amounting to 90-98%, and fruit drop usually occurred within 2 weeks of setting. The newly set fruit grew very rapidly, the pericarp more so than the seed. Marked periodicity in fruiting occurred, a heavy crop being produced every 3-5 years. This was due to fluctuating temperatures during bud burst, causing the flowers on the staminate and pistillate trees to open at different times, and to inadequate nutrition for flower bud formation. Supplementary pollination increased yields. Manuring, irrigation, grafting staminate scion wood on pistillate trees and general cultural improvements are recommended.

5103. Rizzotto, N.
Noce Feltrina: pianta da salvare! **(The Feltrina walnut: a plant worth preserving.)**
Agric. Venezie, 1960, **14**: 142-9, illus.

Notes are given on walnut growing in the Feltre and Cesiomaggiore districts. The subjects discussed are climate, soil, multiplication by seed and occasionally by grafting on seedlings of *Juglans nigra*, varieties (Feltrina, Comune and Grossa di Vignui), culture and yields (30-35 kg. of husked fruit per tree).

5104. Duhan, K.
Neue Methoden und Erkenntnisse bei der Walnuss-Veredlung im Gewächshaus. IV. Teil. Die Entwicklung der in Kisten vorgetriebenen Maschinenveredlungen von 1958 im ersten Jahr. **(New methods for, and observations on, walnut grafting in the glasshouse. IV. The development of the machine grafts of 1958 during the first year after forcing in frames.)**
Dtsch. Baumsch., 1960, **12**: 73-7, illus.

The grafting technique has already been described [see *H.A.*, 29: 3372]. In the present paper the further development of the young grafts is described and illustrated photographically. Reference is made to the response of the trees to a frost in April 1959.—Hochsch. Bodenkult., Wien.

5105. (Smith, C.)
Cotton gin doubles as walnut processing plant.
Western Fruit Gr, 1959, **13**(12): 19.

The walnuts are harvested into wooden bins, 4 ft. square with 1,300 lb. capacity, which are fork-lifted into the washer and huller. After hulling and grading, the nuts are transferred to metal bins, 4 ft. square with 1 ton capacity, and dried by 2 blowers, powered by 7½ h.p. motors. The blowers suck heat from a liquified petroleum gas heating element into 3 underground concrete-block tunnels, which lead to the metal bins containing the nuts. Thirty tons of nuts can be dried at one time.

PLANT PROTECTION OF TEMPERATE FRUITS.

General.

(*See also* 4750, 4755, 6327, 6331.)

5106. Fulton, R. H.
Small fruit diseases in Michigan.
Ext. Bull. Mich. St. Univ. **370,** 1960, pp. 75, illus.

Recognition and control of the various bacterial, fungal and virus diseases affecting strawberries, brambles, blueberries, currants, gooseberries and vines.

5107. Natal'ina, O. B.
Raspberry diseases. [Russian.]
Sadovodstvo, 1960, No. 3, pp. 30-2, illus.

Brief notes are given on 3 fungus, 2 bacterial and 4 virus diseases and on dodder, with general recommendations on cultural and chemical control. The provision of certified planting material on the English and Swedish patterns is recommended.

5108. McGrew, J. R.
Strawberry diseases.
Fmrs' Bull. U.S. Dep. Agric. **2140,** 1959, pp. 24, illus.

Distribution, symptoms, damage caused, prevention and control of numerous diseases, including those caused by nematodes.

Viruses.

(*See also* 5182.)

5109. Schuch, K.
Das Virusproblem im Obstbau. **(The virus problem in fruit growing.)**
ErwObstb., 1960, **2**: 127-31, bibl. 22.

A review dealing with top fruits and almonds.

5110. Gilmer, R. M., and Brase, K. D.
Relative infection potentials of rootstock and scion in increasing virus incidence in the deciduous tree fruit nursery.
From abstr. in *Phytopathology*, 1960, **50**: 240.

The probability of virus infection of a nursery tree at propagation depends on (1) virus incidence in the scions, (2) virus incidence in the rootstocks, and (3) the effects of the presence of the virus on the scion union. Formulae are given for calculating the total virus incidence in the nursery in relation to the number of successive propagations.

5111. Jordović, M.
Neke bolesti voćaka slične virozama. **(Some virus-like diseases of fruit trees.)**
Zasht. Bilja, 1959, No. 51, pp. 15-17, bibl. 2, illus.

Prune crinkle leaf of plum, variegation of cherry and raspberry, frost injury to raspberry, and yellow spot of peach and apricot caused by mites are described. These disorders have virus-like symptoms but are non-transmissible. [From author's summary.]—Inst. Fruit Growing, Čačak.

5112. McCrum, R. C.
Bark patch grafts as a means of indexing for the stem-pitting virus.
Abstr. in *Phytopathology*, 1960, **50**: 241.

The stem-pitting virus was found in a latent form in several apple varieties tested with bark patches of a variety sensitive to the stem-pitting virus. Elliptical patches of bark, cut from a Virginia Crab tree free of stem-pitting, were grafted to limbs of Cortland, Golden Delicious and Red Delicious top-worked on 11 varieties of interstock. Similar patches were also relocated as a control on the donor variety, Virginia Crab. The grafting was done on May 26 and June 3, 1959, and examined on September 10, 1959. No pitting was evident when Virginia Crab was grafted on Virginia Crab. Tissue produced under the bark patch was pitted on all 3 standard top-worked varieties tested. The pitting was typical in nature, but its intensity varied with the various stock-scion combinations. It is still unknown whether the virus occurred originally only in the seedling root, only in the interstock variety, only in the scion variety, or in all of them. The bark-patch grafting technique seems to offer a quick method of indexing woody plants in which the virus disease results in abnormal wood and bark formation.

5113. MALLACH, N.
Zur Morphologie der Enationen auf Blättern viruserkrankter Kirschbäume. (**On the morphology of the enations of leaves from virus-diseased cherry trees.**)
Phytopath. Z., 1960, **38**: 316-18, bibl. 2, illus.

5114. SCHUCH, K., AND MISCHKE, W.
Der Nachweis eines Virusgemisches in einer enationenkranken Süsskirsche. (**The detection of a virus complex in a sweet cherry affected with enation disease.**) [English summary 9 lines.]
Z. PflKrankh., 1960, **67**: 327-32, bibl. 2, illus.

Relationship between enation and Pfeffinger diseases.

5115. BARKSDALE, T. H.
Green ring mottle virus as an entity distinct from the sour cherry ring spot and yellows viruses.
Phytopathology, 1959, **49**: 777-84, bibl. 19.

Differential symptoms [see *H.A.*, 30: 395].

5116. NYLAND, G.
Heat inactivation of stone fruit ringspot virus.
Phytopathology, 1960, **50**: 380-2, bibl. 11.

Stone fruit ringspot virus was consistently inactivated by treatment at 100° F. for 2 weeks in cherry and for 3 weeks in peach, with simultaneous elimination of sour cherry yellows, prune dwarf, peach necrotic leafspot, Muir dwarf, and peach stunt diseases. Evidence was obtained that these diseases are caused by the ringspot virus. The appearance of flushes of symptoms of peach necrotic leafspot during the summer months is probably the result of temporary heat inactivation or immobility of ringspot virus in growing shoot tips followed by invasion of healthy tissue produced during the inactivation period. [Author's summary. See also *H.A.*, 28: 242.]—Univ. Calif., Davis.

5117. JORDOVIĆ, M., AND NIKŠIĆ, M.
Uticaj šark šljive (Prunus virus 7-Hristov) na prinose i hemisko-tehnološka svojstva plodova šljive požegače. (**The effect of prunus virus 7 (Christov) on the yield and chemical and technological properties of Požegače plums.**) [English summary 1½ pp.]
Arh. poljopr. Nauke, 1957, **10**(28): 85-95, bibl. 6.

The effects of infection in this susceptible variety were more marked in the morphological than the chemical characteristics of the fruit. Infected fruit was 20% smaller and lighter, and with a smaller proportion of pulp to stone. Premature fruit drop, mainly due to the virus, was 40·5%, 13% dropping too early to be of use. Healthy fruit contained 1·6% more sugar and 0·127% less acid. These physical and chemical changes were accentuated in the dried product and preserves, thus rendering the processing of infected fruit uneconomical.—Inst. Fruit Growing, Čačak.

5118. VEENSTRA, M. A., AND HUGUELET, J. E.
Dormant-plant symptoms for identification of the shoe-string virus in the Burlington and Jersey highbush blueberry varieties.
From abstr. in *Phytopathology*, 1959, **49**: 553.

On 1-year-old wood symptoms appearing as oval blotches and streaks ranging from 0·5–15 cm. long and varying in colour from light to brilliant red proved reliable within an error of 1%. Infection incidence in one plantation was reduced from 9·36 to 0·09% in 2 years by roguing according to dormant-plant symptoms.

5119. HUTCHINSON, M. T., GOHEEN, A. C., AND VARNEY, E. H.
Wild sources of blueberry stunt virus in New Jersey.
Phytopathology, 1960, **50**: 308-12, bibl. 11, illus.

Several species of *Vaccinium*.

5120. LISTER, R. M.
Strawberries and soil-borne virus diseases.
Agriculture, Lond., 1960, **67**: 25-9, illus.

The distribution and symptoms of virus diseases, including arabis mosaic transmitted by eelworms (*Xiphinema* spp.), raspberry ringspot and tomato black ring, are described, and the susceptibility of some varieties is indicated. Control measures include diagnosis in runner beds, destruction of all infected plants, and efficient weed control, since many weeds are susceptible to the diseases. [See also *H.A.*, 29: 237, 30: 400 and 3539.]—Scot. hort. Res. Inst., Mylnefield.

5121. Schöniger, G.
Anatomisch-entwicklungsgeschichtliche Untersuchungen an nekrosevirus-infizierter *Fragaria vesca* L. **(Anatomical and ontogenetical studies of *Fragaria vesca* infected with the necrosis virus.)** [English summary ¾ p.]
Phytopath. Z., 1960, **38**: 250-73, bibl. 7, illus.
See also *H.A.*, 30: 3542.

5122. Razvjazkina, G. M.
Green petal virus of strawberries and its transmission. [Russian, with English, German and French summaries 6 lines each.]
Vestn. s.-h. Nauki, 1960, **5**(2): 139-40, bibl. 1.
The virus has been transmitted from infected clover plants by the cicada *Aphrodes bicinctus*. To prevent spread of the virus, efficient weed control is recommended, and weed hosts, including clover, in the vicinity should be dusted with DDT.

5123. Fogliani, G.
Considerazioni sulle attuali ricerche delle malattie da virus nella vite in Portogallo. **(Observations on work in progress on virus diseases of vines in Portugal.)**
Ann. Fac. Agrar. Milano, 1957 (issued 1958), **6**: 25-43, bibl. 13.
Notably infectious degeneration and infectious chlorosis (panachure or white mosaic).

5124. Vuittenez, A.
Nouvelles observations sur l'activité des traitements chimiques du sol pour l'éradication des virus de la dégénérescence infectieuse de la vigne. **(New observations on the action of soil chemical treatments used for the eradication of the virus causing infectious degeneration of the vine.)**
C. R. Acad. Agric. Fr., 1960, **46**: 89-99, bibl. 10.
In trials of various soil fumigants to prevent the spread of the infectious degeneration virus, beneficial effects were obtained with DD, CS_2, and CH_3Br [see also *H.A.*, 29: 2281]. Soil adhering to the roots of infected plants was shown to contain *Xiphinema index* and another nematode similar to *Xiphinema*. At one site where plants became infected with the virus nematodes of the genera *Rotylenchus, Dorylaimus* and *Criconemoides* were discovered, but not a single *Xiphinema* nematode was found. The soil fumigants mentioned reduced the soil population of *Criconemoides* nematodes.—Stat. Path. vég., Colmar.

5125. Lelakis, P. I.
The use of Lindner's tintometer method in the diagnosis of virus disease in vines (infectious degeneration). [Greek, with French summary 7 lines.]
Reprint from *Geoponika*, 1959, Vol. 5, No. 65, pp. 7, bibl. 12.
The method proved unsuitable in tests on American and European vines in Greece over a 3-year period.

5126. Pesante, A.
Il seccume del nocciòlo Gentile delle Langhe. **(Die-back of the hazel nut variety Gentile in the Langhe area.)**
Frutticoltura, 1960, **22**: 241-50, illus., and *Inf. fitopat.*, 1960, **10**: 160-1, illus.
The application of major and minor elements via the leaves or the soil failed to alleviate the symptoms. A virus infection is strongly suspected, and transmission tests are in progress.

Bacteria.

(*See also* 6308.)

5127. Anon.
Bacterial canker of stone fruit.
Agric. Gaz. N.S.W., 1959, **70**: 652-4, illus.
Symptoms of the disease, which is caused by *Pseudomonas syringae* and attacks all stone fruits, are described. Infection takes place in late autumn and winter through cracks, wounds or leaf scars, and leaf and fruit infection may occur throughout the growing season. Control measures recommended, pending the results of investigations now in progress, include: (1) the completion of pruning as soon as possible after leaf fall, except for cherry trees which should be pruned before early autumn; (2) spraying with bordeaux mixture (10-10-100) during leaf fall and again at early bud swell, adding ½ gal. of white oil per 100 gal. spray or a good spreader to improve its efficiency; and (3) the production of trees worked on a framework of a resistant variety.

5128. Kitajima, H., and others.
Effectiveness of some antibiotics against peach bacterial canker. [Japanese, with English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat., hort. Stat., 1959, No. 5, pp. 115-28, bibl. 8.
Antibiotics were absorbed by peach leaves readily on a day in spring but poorly later in the season, and they remained active in the foliage for about 10 days. Agrimycin 100, Phytomycin and chloromycetin inhibited the development of *Xanthomonas pruni*, as tested by the cup-plate method, when used separately or when mixed with insecticides such as Dithane Z-78, wettable sulphur or parathion. In orchard trials Agrimycin 100 provided fair control early in the season but gave poor protection to the fruits as the season advanced. With serious infections the antibiotics had little effect and were inferior to a zinc-lime mixture.

Fungi.

(*See also* 4681, 4749, 4758, 4827, 4854, 4892, 5011, 5024, 5222, 5225, 5229, 6299, 6308.)

5129. Curtis, K. M.
Fungi associated with cankers of apple trees.
Monogr. Cawthron Inst. **3**, 1959, pp. 56-65, bibl. 10.

Frequency of occurrence of 13 fungi isolated from 91 apple trees.

5130. Fulkerson, J. F.
Botryosphaeria ribis and its relation to a rot of apples.
Phytopathology, 1960, **50**: 394-8, bibl. 21, illus.

Isolates of the fungus from 8 different host species and 9 different geographical locations were tested and all but 1 isolate induced a rot of apples. When stored at temperatures of 65 or 75° F. inoculated apples rapidly developed rot symptoms, but temperatures of 85 and 55° F. were less favourable for rot development. The rot was characteristically soft in texture and clear or colourless to pink-tan in colour. [From author's summary.]—U.S.D.A., Beltsville, Md.

5131. McClendon, J. H., Somers, G. F., and Heuberger, J. W.
The occurrence of a variety of enzymes hydrolyzing cell wall polysaccharides in apples rotted by _Botryosphaeria ribis_.
Phytopathology, 1960, **50**: 258-61, bibl. 21.

Enzyme preparations from apples rotted by *Botryosphaeria ribis* (white rot) were freed of non-colloidal material and freeze dried. These were compared with similar preparations from sound apples and tomatoes, and a commercial fungal "Pectinase" mixture. The rotten apple preparations hydrolyzed at varying rates the galacturonan, galactan and araban moieties of pectin; they also hydrolyzed galactomannan (guar gum), xylan and pectin ester groups, but apparently not cellulose. The sound apple or tomato preparations in some measure also hydrolyzed these substances, but the mode of action and change of activity with pH were frequently different. The sound apple preparations were in some cases (such as pectin esterase) at least as active as the rotten apple preparations. Evidence is cited for the existence in the preparations studied of several different enzymes all hydrolyzing galacturonan; the same appeared to be true with respect to galactomannan. More active preparations were usually obtained from buffer extracts of the press cake of the rotten apples than from the juice initially expressed. [Author's summary].—Univ. Del., Newark.

5132. Szirmai, J., and Vörös, J.
Az actidion antibiotikum alkalmazása az almafa lisztharmat (*Podosphaera leucotricha* (Ell. et Ev.) Salm.) ellen. **(The use of the antibiotic Actidione for the control of apple mildew (_Podosphaera leucotricha._)** [English and Russian summaries 1 p. each.)
Kísérl. Közlem., Sect. C, 1959, **52C**(1): 25-37, bibl. 12, illus.

In glasshouse experiments unpurified Actidione at 2·5–3·0 µg./ml. gave good mildew control on apples without causing foliage injury. In field trials, however, repeated applications even at 1·5 µg./ml. injured the foliage. Lower concentrations or a reduced number of applications minimized injury but were also less effective. Actidion at 1·5 µg./ml. reduced scab infection by 43% and a 3 µg/ml. by 70%.

5133. Barnes, E. H.
The role of phloridzin and other phenolic compounds in the host-parasite physiology of the apple scab disease, incited by _Venturia inaequalis_ (Cke.) Wint.
Diss. Abstr., 1960, **20**: 2509-10, being *L.C. Card No. Mic.* 59-6466 of 65 pp.

Apple tissues infected with *Venturia inaequalis* were found to contain increased quantities of a fluorescent phenolic compound and also a substance identified as phloridzin, which stimulated the growth of the fungus. Of the break-down products of phloridzin, only *p*-hydroxyphenylpropionic acid showed a similar stimulatory activity, and this compound is therefore regarded as the basis of the action of phloridzin. Break-down products of phloridzin and *m*-inositol were found to build up resistance to one or other of the races of the fungus in the tissues of the host, and it is concluded that resistance to *V. inaequalis* is effected by the products of the host-parasite interactions initiated by the parasite.—Purdue Univ.

5134. ten Houten, J. G., and others.
Het schurftonderzoek in Nederland van 1955 t/m 1958. I-III. **(Scab research in the Netherlands from 1955 up to and including 1958. Parts I-III.)** [English summary ⅓ p.].
Meded. Dir. Tuinb., 1959, **22**: 363-74, bibl. 6, illus., 441-53, bibl. 11, illus., and 1960, **23**: 178-91, bibl. 6.

In this review of recent Dutch work the following aspects are summarized by various members of the Commission for Apple and Pear Scab Research: Instruments for determining infection periods, by J. J. Post. The representativeness of scab warnings, by J. J. Post. Laboratory experiments on infection by ascospores and conidia, by G. S. Roosje. A link between laboratory and field tests of fungicides against apple scab, by G. S. Roosje. Field trials on the curative effect of some fungicides on apple and pear scab, by A. F. H. Besemer. In the last paper it is reported that all the organic mercury compounds tested gave effective curative control of apple scab, when applied within 72 hours of the beginning of the infection period. Mercury-free fungicides showed a relatively poor curative effect. Certain materials, including captan, thiram, Tuzet, dinitrorhodanebenzene and ziram, gave nearly 100% curative control, if applied within 24 hours of the beginning of the infection period. Cepyram (cetyl - pyridiniumdimethyl - dithiocarbamate) a

0·2% and Cyprex at 0·18% were effective when applied within 48 hours. The preventive action of Cepyram lasted only 7 days and the spray caused russeting of some varieties; it should not be used more than 4 times during the season. Repeated applications of Cyprex caused severe russeting of Golden Delicious but were not injurious to many other varieties.

5135. CORELLI GRAPPADELLI, G.
Prove de germinazione dell'agente della ticchiolatura del melo in presenza di alcuni anticrittogamici. (**Germination tests with the pathogen of apple scab in the presence of certain fungicides.**) [English summary 9 lines.]
Ann. Sper. agrar., 1960, **14**(1), Suppl. pp. xxxv-xxxvii.

The *in vitro* fungicidal action of 6 products in inhibiting ascospore germination decreased in the order: organic mercury, captan, ziram, TMTD, copper oxychloride, zineb. In the case of conidial germination the order was: ziram (outstandingly effective), captan, organic mercury, and the last 3 products as above.—Ist. Pat. veg., Univ. Bologna.

5136. HULTON, K. E.
Eradicant treatment for apple scab.
Commonw. phytopath. News, 1960, **6**: 28.

Methods found effective in New South Wales are: (1) a post harvest spray of 0·01% PMC (phenyl mercuric chloride) followed by the normal schedule of sprays the following season; (2) a post harvest spray of 0·05% PMC followed by a reduced spray programme; and (3) a post harvest spray of 0·1% PMC as a single treatment to control scab throughout the following season.

5137. LEE, C. H.
Studies on pear scab and its control. [Chinese, with English summary ½ p.]
Acta phytopath. sin., 1959, **5**: 65-78, bibl. 16, illus.

Scab (*Venturia pirina*) was successfully controlled by the timely cutting out of infected shoots followed by 3 bordeaux sprays, the first being applied immediately symptoms were seen and the second and third in July. This treatment reduced infected fruit by 85%.

5138. GOVI, G., CASARINI, B., AND ERCOLANI, G. L.
Influenza degli acuprici sull'allegagione dei frutticini di melo. (**The effect of non-copper fungicides on apple fruit set.**)
Inf. fitopat., 1960, **10**: 163-4.

Zineb at 0·25% allowed a higher percentage of fruit set in apples than captan, two copper fungicides, ziram or TMTD, and gave good control of scab without damaging the leaves or russeting the fruit.

5139. DINGLEY, J. M.
***Eutypa* canker of apricots.**
Orchard. N.Z., 1960, **33**: 78-9, illus.

Symptoms of the die-back disease caused by *Eutypa armeniacae* are described. Control is obtained by the destruction of all diseased wood and by pruning on the long lateral system, in order to keep all pruning wounds as far as possible from the leaders. The cuts should be covered immediately with a wound dressing such as "green crude" petroleum.

5140. ZATYKÓ, J., AND GARAY, A.
A hervadási toxinok és a kajszi gutaütésének kérdése. (**Wilting toxins and the problem of apoplexy in apricots.**)
Kísérl. Közlem., Sect. C, 1959, **52C**(1): 39-42, bibl. 11.

Young apricot shoots placed in a filtrate of *Verticillium albo-atrum* showed symptoms similar to apoplexy and wilted. A relationship between wilting toxins and apoplexy is presumed.

5141. TURRI, E.
Prove sperimentali condotte nel 1958-1959 in provincia di Roma sull'impiego di alcuni acuprici contro la *Taphrina deformans* (Berk.) Tul. (**Tests in 1958-59 in the Province of Rome of non-copper fungicides to control peach leaf curl.**)
Boll. Staz. Pat. veg. Roma, 1959 (issued 1960), **17**: 91-111, bibl. 28, illus.

The author, after a brief review of recent French and Italian work on the subject, describes and summarizes the results of his own trials. He concludes that ziram and bordeaux gave about the same degree of control and were significantly better than maneb and captan.

5142. PRATELLA, G. C., and KOVÁCS, A.
Attività sistemica del solfato di 8-ossichinolina in giovani piante di pesco. (**The systemic activity of 8-oxyquinoline sulphate in young peach trees.**)
Ann. Sper. agrar., 1960, **14**: 171-83, illus.

Solutions of 8-oxyquinoline in various concentrations ranging from 0·1 to 1·5% were applied to 2-year-old peach trees of the variety Hale by injection into the trunk. The 1% and 1·5% solutions proved toxic within 48 hours and the 0·5% solution within about 72 hours. Solutions up to and including 0·37% produced no toxicity symptoms, nor did a 0·25% solution applied to the soil on 4 successive days. Subsequent bio-assay showed that the product accumulated most in the leaves and least in the roots, and the degree of accumulation was unaffected by the height of the point of injection on the stem. At 3×10^{-4} the compound was distinctly fungistatic when tested *in vitro* against the peach silver-leaf fungus, *Stereum purpureum*. As this concentration was 20 times lower than the minimum reached in trees receiving 0·1%, further investigations are proceeding on the possibility of adapting these findings to the practical control of silver leaf.—Osserv. Mal. Piante, Bologna.

5143. Daines, R. H., and others.
Rusty spot of peach and its control in New Jersey.
From abstr. in *Phytopathology*, 1960, **50**: 239.

Studies indicate that rusty spot of peach is probably caused by a fungus pathogen, which is able to kill the surface cells of the fruit but is unable to sporulate freely on the dead host cells. Sulphur treatments provided good protection against rusty spot, but captan, glyodin, thiram, zineb and ziram gave little or no control.

5144. Lewis, F. H.
Improved control effective for black knot on prunes.
Science for the Farmer, 1959-60, **7**(3): 5, illus.

The fungus, *Dibotryon morbosum*, causes outgrowths on the limbs and trunks of prune trees. Control may be obtained by cutting out all infected tissue, which should be burned. The wound and surrounding bark should be painted with a suspension of 1 tablet of Actidione in 1 qt. of water, but this treatment may not be effective if the fungus extends beyond the visible knot. Excellent protection against infection on new growth was obtained with sprays of zineb, 65% w.p. at 2 lb./100 gal., applied 7-8 times per season at 7–10-day intervals.

5145. Greene, G. L.
Possible causes of stem hypertrophy in the black knot disease of *Prunus* spp.
From abstr. in *Phytopathology*, 1959, **49**: 539.

Studies of the *Cladosporium* stage of *Dibotryon morbosum* were begun to determine whether this fungus produces a growth substance which might induce hypertrophy in *Prunus* stems infested with black knot. A highly active substance, apparently chemically distinct from IAA, was found.

5146. N.S.W. Department of Agriculture, Biological Branch.
Anthracnose of berry fruits.
Agric. Gaz. N.S.W., 1960, **71**: 143, 163, illus.

Recommendations for control of *Elsinoe veneta* by cutting out old canes after fruiting and by copper fungicide sprays on the new canes of loganberries, raspberries, etc.

5147. Irvine, T. B., and Fulton, R. H.
A study of laboratory methods to determine susceptibility of strawberry varieties to grey mold fruit rot, *Botrytis cinerea*.
From abstr. in *Phytopathology*, 1959, **49**: 542.

Susceptibility of strawberry varieties and seedlings was evaluated by: (1) the incorporation of sterilized berry juice into liquid and solid media to measure its effect on the causal organism's growth response; (2) spore germination studies using juice extracts of immature and mature berries; and (3) measurement of direct fungal penetration into sound berries at different stages of maturity. Differences in the ability of the juice of different strawberry varieties to support fungal growth were apparent. The juice of Albritton, Premier (Howard 17), Robinson and Earlidawn exhibited a daily increase in growth of 35·0, 15·7, 12·6, and 12·0 mm., respectively, while that of Empire and Sparkle inhibited growth completely. This agreed with the results of the liquid culture technique, using weight as the criterion, and with spore germination measurements. Depth of penetration into whole berries was appreciable but depended upon variety and its stage of maturity.

5148. Graniti, A.
Il "mal dell'esca" della vite in Puglia. **("Bait" disease of vines in Apulia.)**
Ital. agric., 1960, **97**: 543-50, illus.

The disease, apparently identical with black measles in California, is probably caused by the fungus *Fomes igniarius*. Promising control was achieved by painting the trunks and main branches of all vines, whether diseased or apparently healthy, with a solution of 500 g. of sodium arsenite and 50 c.c. of a wetting agent in 100 l. of water, after the pruning wounds had healed, but before the buds had begun to swell.—Ist. Pat. veg., Univ. Bari.

5149. Vergara C., C.
Pudrición negra seca de la vid o black-rot. **(Black rot of vines).**
Agric. Ganad. Chile, 1959, **5**(22): 9-10.

This disease, caused by *Guignardia bidwellii*, has appeared on vines in Chile. Growers are advised to remove and burn all diseased shoots and bunches and old tendrils left on the wires, to plough in weeds and vine residues in winter, and to apply fungicides in the spring. Either 600 g. of bordeaux mixture or 200 g. of ferbam or captan in 100 l. of water should be applied when the shoots reach a length of 40–60 cm., again when the grapes have reached the size of peas, and finally when they begin to ripen. This last treatment may conveniently be replaced by dusting with a mixture of 1 kg. of finely divided sulphur and 20 g. of ferbam or captan, thus combining black rot and powdery mildew treatments.

5150. Pieri, G.
Prove di lotta contro la *Botrytis cinerea* dell'uva. **(Experiments on the control of *Botrytis cinerea* on grapes.)**
Ann. Sper. agrar., 1960, **14**(2), Suppl. pp. xi-xxii.

An oxyquinoline derivative mixed with a compound allied to captan, and two different ziram products, all applied at 40 kg./ha. as wettable powders, gave very good control of grey mould if applied when the grapes began to colour and again when they began to mature. Earlier treatments were ineffective.

The mixed fungicide gave the best results.—Staz. sper. Vitic. Enol., Conegliano.

5151. Foschi, S.
La peronospora. **(Downy mildew of vines.)**
Ital. agric., 1960, **97**: 368-70, illus.
Seasonal factors affecting infection and control with zinc and copper.

5152. Anon.
Viñatero, prevéngase contra la peronóspora. **(Vine grower, be prepared against downy mildew.)**
Circ. Estac. exp. agropec. Cinco Saltos **3**, 1958, pp. 2.
Recommendations for spraying with copper compounds or captan in Argentina.

5153. Günthart, E., and Mühlethaler, P.
Erfahrungen in der Anwendung des Helikopter für die chemische Schädlingsbekämpfung bei Kartoffeln, Zuckerrüben und Reben in der Schweiz. **(Experiences gained in the use of a helicopter for spraying potatoes, sugar beets and vines in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 279-82.
Experimental aerial applications of fungicides to vines have given encouraging results against downy mildew. Under Swiss conditions a helicopter should be especially useful for the first three treatments. Data on costs are tabulated.—Dr. R. Maag A.G., Dielsdorf-Zürich.

5154. Foschi, S.
La muffa grigia. **(Grey mould [on grapes].)**
Ital. agric., 1960, **97**: 652-3, illus.
Captan and TMTD recommended to control *Botrytis cinerea* on grapes.

5155. Casarini, B., and Rossini, P.
Alcuni aspetti degli zolfi sospensibili. **(Some aspects of wettable forms of sulphur.)**
Inf. fitopat., 1960, **10**: 141-4, illus.
In experiments carried out on 2 vine varieties the best control of powdery mildew (*Uncinula necator*) was obtained with a mixture of 0·5% copper oxychloride and 0·2–0·6% wettable sulphur, which was approximately 10 times as effective as the oxychloride alone. The very low effectiveness of zineb was greatly enhanced by sulphur. The greater the particle size of the sulphur, the higher was its effectiveness.

5156. Casarini, B., Govi, G., and Rossini, P.
La lotta antioidica in viticoltura: limiti di efficacia e di applicazione degli zolfi sospensibili. **(Powdery mildew control in viticulture: limits of effectiveness and application of wettable sulphur.)**
Inf. fitopat., 1960, **10**: 117-22, illus.
Karathane at 0·15%, added to zineb at 0·3%, was toxic to vine leaves from the 4th application onwards. Colloidal and various forms of wettable sulphur from 0·4–1% used in the same way were less toxic than karathane, their harmful effects being inversely related to particle size. The coarser forms also gave the best, though not complete, control of powdery mildew. It is emphasized that treatments must be more frequent for powdery than for downy mildew.

5157. Goidànich, G., and Cosmo, I.
La defogliazione precoce della vite. **(Premature leaf fall in vines.)**
Inf. fitopat., 1960, **10**: 111-16, illus.
Vines treated during the summer with zineb were leafless by mid-September. Where sulphur had been added to the zineb the vines were only partially defoliated, and those treated with copper fungicides were still in full leaf. Powdery mildew severely affected those receiving neither copper nor sulphur, and was not adequately controlled by the amount of sulphur in the commercial mixture of zineb + sulphur. The removal of non-lignified portions of shoots from vines suffering early defoliation is recommended.

5158. De Rosa, M.
Il cancro corticale del castagno. **(Bark canker of chestnut trees.)**
Progr. agric., 1960, **6**: 459-63, illus.
The recovery of chestnut trees from bark canker (*Endothia parasitica*) after continued removal of diseased coppice shoots [see *H.A.*, 28: 2388] is commented on. This recovery and development of immunity does not apply to trees grown for nut production. In these the disease can be checked temporarily by frequent and careful pruning or by coppicing, but eventually proves fatal. Species of trees suitable for replacing chestnuts are discussed.

Nematodes.

(*See also* 4681, 5120, 5124.)

5159. Rogers, H.
Big gains recorded in nematode fight.
Western Fruit Gr, 1959, **13**(8): 9-11, illus.
Recommendations for pre-planting soil fumigation with various nematicides in deciduous orchards and vineyards.

5160. Kirkpatrick, J. D., and others.
Population levels of *Pratylenchus penetrans* and *Xiphinema americanum* in relation to potassium fertilization of Montmorency sour cherries on mazzard rootstock.
From abstr. in *Phytopathology*, 1959, **49**: 543.
Four levels of K, 3 levels of N and 2 levels of P were applied. Populations of both nematodes were significantly lower under trees receiving the higher rates of K, but were not significantly affected by N or P. Root growth was not significantly influenced by K. Tree vigour was positively associated with K level and negatively with number of nematodes.

5161. KIRKPATRICK, J. D., AND OTHERS.
Relation of nematode populations to nutrition of sour cherries.
From abstr. in *Phytopathology*, 1959, **49**: 543.

Populations of *Xiphinema americanum* and *Paratylenchus* spp. rose as leaf N increased and as leaf K decreased and were correlated positively with N and negatively with K. No statistically significant relationship was found between nematode populations and soil analysis.

5162. WARREN, L. E.
Response of established Tokay grapes to soil fumigants.
Down to Earth, 1960, **15**(4): 13-16, bibl. 6, illus.

Noticeable increases in vigour and considerably greater yields of grapes were obtained by the addition of ethylene dibromide or Fumazone to irrigation water for the control of nematodes. The effect of the fumigation persisted into the second season.—Sacramento Field Stat., Dow Chem. Co.

5163. LEAR, B., AND RASKI, D. J.
Root-knot nematode survival in excised grape roots in soil fumigated with ethylene dibromide.
From abstr. in *Phytopathology*, 1959, **49**: 543-4.

Roots of Thompson seedless grapes infested with *Meloidogyne incognita acrita* were used in greenhouse tests. The roots were buried in clay pots, using one series of unchopped roots and a second series in which the roots were finely chopped to hasten decomposition. Immediate treatment with 0·05 and 0·1 ml. ethylene dibromide was given, similar amounts again being given after 1, 2, 4, 8 and 12 months. Nematode survival in untreated soils was high for at least a year in unchopped roots but for only 4–8 months in chopped roots.

Mites.

(*See also* 4760, 5229.)

5164. ANON.
Clearance is given to Tedion.
Bett. Fruit, 1960, **54**(9): 22.

The use of Tedion for mite control on apples, crab apples, pears, quinces, plums, prunes, grapes, apricots, cherries, peaches and nectarines has been approved by the U.S. Department of Agriculture. Recommended control (except on grapes) is by the use of 1 lb. of 25% w.p. per 100 gal., a first application being given when most of the overwintering eggs have hatched and a second spray when the two-spotted and other summer mites appear. For grapes 4 lb. Tedion per acre, in sufficient water to cover the plants thoroughly, should be applied just before bloom, followed if necessary by a second application.

5165. (HIBBS, E. T.)
List compounds effective in orchard mite control.
Ia Fm Sci., 1960, **14**(9): 14.

A brief note to the effect that Tedion applied to Red Delicious apples in July proved a highly effective acaricide in 3 years' trials, and should be used in alternation with trithion, ethion or Guthion, all of which were also effective against both mites and insects.

5166. MINISTRY OF AGRICULTURE, LONDON.
Fruit tree red spider mite.
Adv. Leafl. Minist. Agric. Lond. **10**, revised 1959 (issued 1960), pp. 6.

Symptoms, life-history and control on apples, pears and plums.

5167. PIELOU, D. P.
Contagious distribution in the European red mite, *Panonychus ulmi* (Koch), and a method of grading population densities from a count of mite-free leaves.
Canad. J. Zool., 1960, **38**: 645-53, bibl. 16.

Examination of a large number of 100-leaf samples shows that the European red mite is distributed contagiously, not randomly, on leaves of apple trees. When the mean number of mites per leaf is plotted against the proportion of mite-free leaves for the corresponding sample, the points fall in a narrow zone, steepest and narrowest at the lower densities. Following the application of miticides to heavily infested trees it is usual to summarize the findings of the tests by grading the performance of the chemicals as excellent, good, etc., according to mite density as determined by a total count from the 100-leaf sample. A method is outlined, in which, by making use of plotted values, a count of mite-free leaves only is sufficient to allow the assessment of performance in such categories. [Author's abstract.]—Reg. Res. Stat., Summerland, B.C.

5168. NISHIO, Y., AND IMABAYASHI, S.
The population prevalence of *Panonychus ulmi* Koch affected by some new acaricides in an orchard. [Japanese, with English summary].
Jap. J. appl. Ent. Zool., 1958, **2**: 171-8, from *Biol. Abstr., Sect. E*, 1960, **35**, Abstr. 8,707.

Apple trees were sprayed with machine oil, DDT, BHC or parathion and the numbers of mites, eggs and predators were counted on 10 leaves per tree. In the middle of July there was a high mite population on the DDT-treated tree and this continued until the middle of August. Then the leaves of the tree became discoloured, owing to severe mite injury, and this was followed by a rapid fall in the number of mites and eggs. In September and October very few winter eggs were found on the twigs. Non-sprayed trees showed significantly lower mite populations than the DDT-sprayed tree throughout the summer, but there were enough mites to cause foliage injury. In autumn a few winter eggs were found on the unsprayed trees. In the 3 trees sprayed with machine oil, BHC and parathion the populations of mites and eggs remained low from the beginning of July to the beginning of August and no visual discoloration of foliage was observed. A rapid increase in the number of mites started in the middle of August, and all 3 trees showed heavy winter egg infestation. Mite predators were very scarce on all the trees until August, but in autumn *Scymnus* sp. and other predators were found on the DDT-sprayed trees.—Hokkaido agric. Exp. Stat., Sapporo.

5169. Dosse, G.
Über den Einfluss der Raubmilbe *Typhlodromus tiliae* Oud. auf die Obstbaumspinnmilbe *Metatetranychus ulmi* Koch (Acari). **(The effect of the predatory mite *Typhlodromus tiliae* on the fruit tree red spider mite, *Metatetranychus ulmi*.)** [English summary ½ p.]
PflSch. Ber Wien, 1960, **24**: 113-37, bibl. 18.

Five years' trials in an Ontario apple orchard, where individual trees were either covered and unsprayed or exposed and unsprayed, showed that *Typhlodromus tiliae* effectively checks the development of *Metatetranychus ulmi* populations, provided the predator is not disturbed. In the area of Oldenburg, where *T. tiliae* is not indigenous, the predator established itself rapidly when liberated.—Inst. PflSch. landw. Hochsch., Stuttgart-Hohenheim.

5170. Sebbel, H.
Spinnmilbenbekämpfung in geschlossenen Anbaugebieten der schleswig-holsteinischen Elbmarsch. **(Spider mite control in a part of the Elbe fens in Schleswig-Holstein devoted entirely to orchards.)**
ErwObstb., 1960, **2**: 132-3.

In an area of 1,500 ha. devoted exclusively to apples red spider mites were controlled either by a spray of Metasystox at the end of blossoming followed by an application of parathion or diazinon 20 days later or by 3 applications of diazinon or parathion at 10-day intervals. Either programme was successful provided it was adhered to over the whole area. In 1959, however, a parish of 300 ha. compared both methods in adjacent areas with the result that little protection was achieved in either. Reasons for this failure are discussed.—Obstb-Beratungsring Land Schleswig-Holstein, Seestermühe über Elmshorn/Holst.

5171. Cant, R. R.
Leaf scorch of pears caused by two-spotted mite.
J. Agric. S. Aust., 1960, **63**: 294-5, 307, illus.

Tetranychus telarius was completely controlled on pear trees by a Trithion spray at 1 lb. per 100 gal. plus 2 pints white oil and also by HETP and TEPP. Later work showed that the complete schedule of organophosphate insecticide sprays for codling moth control was also effective against this mite. Where the pest has developed resistance to organic phosphates, Tedion is recommended.

5172. Meyer, M. K. P., and Lochner, E. H. W.
Control of two harmful mites on peach trees.
Fmg S. Afr., 1960, **35**(12): 15-16, illus.

Where the brown mite (*Bryobia praetiosa*) and the silver peach mite (*Aculus cornutus*) occur together, recommended control is by spraying with 1–1·5 lb. of 18% Kelthane w.p. per 100 gal. If only the brown mite is present several other sprays, as well as Kelthane, can be used; these include diazinon, malathion, Metasystox and Rogor 40. If only the silver mite occurs Kelthane, wettable sulphur or dusting sulphur may be used, but sulphur must not be applied during hot weather. Winter spraying of summer infested trees is essential; lime-sulphur and oil sprays (with or without DNOC) are suitable. Oil sprays alone must not be used.

5173. Collingwood, C. A., and Dicker, G. H. L.
A comparison of various chemicals for control of the black currant gall mite.
Plant Path., 1960, **9**: 39-48, bibl. 8.

Of 28 chemicals tested 0·04% endrin gave good results for 3 years and both 0·1% fluoroacetamide and 0·04% Thiodan gave good results in 1 trial. The addition of the surfactant dioctyl sulphosuccinate at 0·02% improved the effectiveness of endrin. The best time of application was at the end of the blossom period. Earlier applications were not made more effective by various additives tested. Sulphur sprays were less effective than endrin. Restrictions on the use of endrin in view of its hazardous nature are discussed.—N.A.A.S., Shardlow, and E. Malling Res. Stat.

5174. Vanwetswinkel, G., and Paternotte, E.
De rondknop op zwarte bessen. **(Big bud of black currants).**
Belg. Fruit Rev., 1959, **11**: 2.

Endrin at 0·3% was the only one of many insecticides tested that gave good control of *Phytoptus ribis*. It was applied twice, on 29 April and 14 May, just before flowering.—OpzoekSt., Gorsem.

5175. Thon, B.
Höstbesprutning mot jordgubbskvalstret (*Tarsonemus pallidus* Banks). **(Autumn spraying against the strawberry mite.)**
Växtskyddsnotiser, 1959, **23**: 70-3, illus.

Endrex 20 was the most effective of 4 acaricides tested.

Insect pests.

(*See also* 4751, 4760, 5024, 5229, 5352, 5798, 6291.)

5176. Redenz-Rüsch, I.
Studies of the insect pest and predator fauna of an orchard in "Bergische Land", and the influence of pesticides on this fauna.
Höfchen Briefe, 1959, **12**: 169-256, bibl. pp. 9, illus.

A comparison was made over 2 seasons of the fauna of a plot sprayed with Metasystox and Folidol E 605 forte and that of an unsprayed plot in an apple orchard. Little or no difference existed between the two plots in respect of the composition of their fauna. The population density of most species was much smaller at all times in the treated plot, but only Coccidae were completely eliminated. Equal or higher infestation figures than those recorded in the untreated plots, however, were recorded in the treated plots for a few species. Although spraying greatly reduced existing populations of aphids and mites, it caused them to lay eggs at a far greater rate in the autumn. Spraying brought about an almost complete elimination of numerous faunal groups each time it was carried out, but the treated plot was re-colonized a few weeks after each spray application. The crops obtained from the sprayed plot were larger and of better quality than those from the untreated plot.—Inst. Phytopath., Bonn. Univ.

5177. Madsen, H. F.
Dormant sprays for apples and pears.
Western Fruit Gr, 1959, **13**(12): 13-14, illus.

The pests which attack apples and pears in California during the dormant or delayed dormant periods are tabulated, together with a number of oil-phosphate compounds and the degree of control obtainable with each. With the exception of pear psylla, which should be treated at the delayed dormant stage, all these pests may be effectively controlled during either period.—Univ. Calif., Berkeley.

5178. Allen, W. W.
Strawberry pests in California.
Circ. Calif. agric. Exp. Stat. **484**, 1959, pp. 39, illus.

The appearance, life-history, damage done and suitable control measures are described for each pest.

5179. Cox, J. A.
Improved insect control.
Amer. Fruit Gr, 1960, **80**(3): 24, illus.

Sprays of DDT have given good control of grape insect pests, but the residue on fresh grapes is often higher than the permitted level of 7 p.p.m. A schedule of 2 sprays of DDT followed by 1 of a phosphate insecticide has given excellent control and permissible residues. Other materials giving satisfactory control and residues include 1·5 lb. 15% parathion w.p., 2 lb. 25% diazinon w.p., 1 lb. 25% Guthion w.p. and 2 lb. 50% Sevin w.p., all per 100 gal.—Erie Co. Field Res. Lab., North East, Pa.

5180. Hamstead, E. O., and Gould, E.
Control of the woolly apple aphid on roots of apple nursery stock.
J. econ. Ent., 1960, **53**: 217-20, bibl. 2, illus.

Suspensions of BHC, lindane and aldrin at 20 lb. per acre and of dieldrin at 40 lb. per acre applied to the soil surface along the tree rows gave complete control of *Eriosoma lanigerum* on the roots of apple nursery stock without causing injury. Such heavy rates, however, are impracticable and lighter ones were not so satisfactory. Dipping the roots of apple seedlings into pastes containing BHC, dieldrin or aldrin was effective and safe but was cumbersome to carry out. Spraying the base of the trunks and a narrow band of soil along the rows with BHC, Sevin, demeton or Guthion at about 6-10 oz. per acre gave encouraging control and caused no injury. The minimum effective dosages remain to be determined.—U.S.D.A. and W. Va agric. Exp. Stat., Kearneysville.

5181. Anthon, E. W.
Old pest, new problem.
Western Fruit Gr, 1960, **14**(4): 28.

Effective control of the green peach aphid, which has become resistant to standard organo-phosphorous sprays, was obtained using (1) nicotine, ½ pt + 1 qt. Volck Supreme oil, (2) Phosdrin ½–1 pt., (3) nicotine ¾ pt. + soap ¼ lb. or (4) Thiodan 2 lb./100 gal.

5182. de Fluiter, H. J.
Control of aphids to prevent virus spread in strawberry crops.
Höfchen Briefe, 1959, **12**: 257-75, bibl. 9.

Very good control of *Pentatrichopus fragaefolii* was obtained with fortnightly applications of either 0·1% methyl demeton or 0·1% parathion, the former being the better [see also *H.A.*, 29: 3403]. Spray application gave better results than misting, because thorough wetting of the hearts of the plants is essential.—Inst. PlZiekt. Onderz., Wageningen.

5183. Salgues, R.
Parasitisme chez la vigne et conséquences oenologiques. **(The effects of parasitism by phylloxera on wine quality.)**
Qual. Plant. Maveg., 1960, **7**: 16-30, bibl. 4.

When the aerial parts of vines are parasitized by phylloxera, the leaves and shoots develop in opposite directions in the sense that the leaves become more juvenile and the shoots more senile. Yields and the weight of shoots are reduced, as also is the percentage of pulp in the fruit. The composition of the wine is affected adversely, though not to an extent which would violate the oenological rules laid down for wines of different origin.—Jardin des Plantes, Montpellier.

5184. Pires, M. do C. V.
Carpophilus hemipterus (L.)—(Coleoptera-Nitidulidae)—praga do figo armazenado. **(*Carpophilus hemipterus,* a pest of stored figs.)** [French and English summaries ½ p. each]
Rev. agron. Lisboa, 1959, **42**: 1-56, bibl. 50.

The larvae were more resistant than the adult beetles to DDT, lindane and pyrethrins. In general, lindane was more effective than DDT, which became non-toxic after penetration into the figs. Good results were obtained with 15 p.p.m. of the gamma isomer of lindane and with pyrethrins at 32 p.p.m., both giving complete control for a month.

5185. Lekić, M.
Rhynchites (*Coenorrhinus*) *germanicus* Herbst štetočina jagoda kod nas. **(*Rhynchites germanicus,* a serious pest of strawberries in Yugoslavia.)** [English summary 2 pp.]
Arh. poljopr. Nauke, 1959, **12**(38): 82-99, bibl. 16, illus.

The life history of this insect, which was first noted near Belgrade in 1956, and the damage it causes are described in detail. Complete control was obtained by Diditin (25% DDT) 0·4% or Pantakan S-25 (25% DDT) 0·5% applied when the flower shoots started to develop. Organic phosphorus compounds and BHC preparations, while effective against this insect, are not suitable for treating strawberries.

5186. Foschi, S.
L'anomala e la cocciniglia cotonosa. **(The vine beetle and mealy bug.)**
Ital. agric., 1960, **97**: 556-7, illus.

Notes on the control of *Anomala vitis* and *Pseudococcus vitis.*

5187. Neilson, W. T. A.
Field tests of some hydrolized proteins as lures for the apple maggot *Rhagoletis pomonella* (Walsh).
Canad. Ent., 1960, **92**: 464-7, bibl. 12.

Four enzymatic protein hydrolysates were each more effective lures for adults of the apple maggot than a previously recommended lure of urea-sodium hydroxide. Enzymatic soy and casein hydrolysates were more effective lures than two acid hydrolysates of corn protein (Staley's insecticide baits Nos. 2 and 7). Soy hydrolysate was the most attractive of the enzymatic hydrolysates. The materials were about equally attractive to the two sexes. Flies were not captured in traps until about a week after they emerged, so that trapping records are unreliable for the timing of control sprays. [Author's summary.]—Canada Dep. Agric., Fredericton, N.B.

5188. Braithwaite, B. M.
Effective control of fruit fly.
Banana Bull., 1960, **23**(1): 7.

On stone fruits, citrus and tomatoes with Dipterex, Rogor 40 and bait sprays of malathion plus protein hydrolysate.

5189. Barnes, M. M.
Variegated grape leafhopper control.
Western Fruit Gr, 1960, **13**(2): 29.

Recommendations on pre- and post-harvest control with Sevin, demeton and malathion.

5190. Cellier, K. M.
Considerations in experiments for the control of codling moth (*Cydia pomonella* (L.)) in apples.
Aust. J. agric. Res., 1960, **11**: 186-96, bibl. 16.

Counts of damaged fruit in samples of 100 fruits were considered to be random samples from a binomial distribution both within trees and also in plots up to a size of 4 trees. A single tree plot with 4 samples per tree for unguarded plots, and 1, 2, 3 or 4 trees per plot with 4 samples per tree for guarded plots, were satisfactory plot sizes, where trees were hand sprayed. Where air-blast sprays were used, large plots with double guard rows were necessary, but 2–4 samples per tree were adequate.

5191. Lloyd, N. C.
The codling moth.
Agric. Gaz. N.S.W., 1960, **71**: 35-40, 51.

The first appearance of resistance to DDT in the codling moth (*Cydia pomonella*) occurred in New South Wales in 1956–57. Trials carried out on Granny Smith apples during 1957–59 showed that, when an appreciable measure of DDT-resistance was present, complete control was obtained with Gusathion at 1½–2 lb. 25% w.p./100 gal. or with Sevin at 1½–2 lb. 50% w.p./100 gal., both applied at 3-week intervals. Malathion and Trithion did not give complete control. Gusathion also controlled light brown apple moth and red spider. As Gusathion and Sevin both leave a visible residue on the fruit, it is recommended that malathion in emulsifiable concentrate form should be used when spraying has to be carried out just before harvesting. [See also *H.A.*, 30: 3595.].

5192. Madsen, H. F.
Remedies for codling moth resistance.
Western. Fruit Gr, 1960, **14**(4): 27-8.

Notes on substitutes for DDT [See also *H.A.*, 29: 1297 and 3459.]

5193. Hey, G. L.
New insecticide is better and safer than DDT.
Grower, 1960, **53**: 1186-7.

Trials over 2 years have shown that 2 lb. of 50% Sevin w.p. per 100 gal. (0·1% toxic ingredient) is superior to DDT at 0·1% toxic ingredient for the control of codling moth. Sevin at 1 lb. per 100 gal. is approximately equal in effect to 0·1% DDT. When tested against apple aphids, a pre-blossom application of 2 lb. of 50% Sevin w.p. per 100 gal.

gave almost 100% control.—Murphy Chem. Co. Ltd, Wheathampstead, Herts.

5194. GIUNCHI, P.
La *Carpocapsa pomonella*. (**The codling moth, *Enarmonia* (*Carpocapsa*) *pomonella*.**)
Inf. fitopat., 1960, **10**: 153-4.

Notes on control with lead arsenate plus parathion or with Sevin.

5195. DE JONG, D. J.
Massaal optreden van de appeldamschijfmot. (**A large scale outbreak of the apple leaf miner.**)
Fruitteelt, 1959, **49**: 1106-7, illus.

The apple leaf miner (*Leucoptera* (*Cemiostoma*) *scitella*) became a serious pest in Holland during the warm summer of 1959. The relative susceptibility of some apple and pear varieties is noted. Plums were much less severely attacked. Parathion, applied at high rates after flowering and again in August, gave the best control. Winter spraying to destroy the cocoons was not effective—I.P.O., Wageningen.

5196. HAINES, R. G.
Be on the lookout for red-banded leaf roller.
Amer. Fruit Gr, 1960, **80**(5): 40, illus.

For satisfactory control of *Argyrotaenia velutinana* on tree and small fruits it is essential to spray early, either just before or immediately after first brood egg hatch. Endrin, applied at ½ lb. active material per 100 gal. at egg hatch and 10–12 days later, has given more than 99% control. Other insecticides giving satisfactory control are cited.

5197. VAN HELVOORT, P.
De heggebladroller (**The hedge leaf roller, *Cacoecia rosana* L.**)
Fruitteelt, 1959, **49**: 1183.

Experiments over 2 years showed the time of spray application to be of primary importance in controlling *Cacoecia rosana* on apple trees. Time and rate of emergence varied greatly with the season. A single application of 1% spray of 50% DDT, given at twice the normal volume when 60–70% of the eggs had hatched, completely prevented fruit damage but did not destroy all the caterpillars. A single spray of DDT + malathion, applied when 30% of the eggs had hatched, gave excellent control.

5198. ANON.
Que es *Eulia*? (**What is *Eulia?***)
Circ. Estac. exp. agropec. Cinco Saltos, **1**, 1958, p. 1.

Eulia spp. and their control on apples, etc. [see *H.A.*, 29: 299].

5199. VAN FRANKENHUYZEN, A.
De rode knopbladroller: een plaag van toenemende betekenis in fruitgewassen. (**The eye-spotted bud moth: a pest of increasing importance on fruit crops.**)
Fruitteelt, 1960, **50**: 402-3.

The larvae of *Spilonota ocellana* eat the skin of apples in late summer and burrow into the unopened buds in early spring. Control can be obtained by spraying with DNC in early spring or with DDT emulsion at the mouse-ear stage. If necessary, a phosphoric ester, such as Phosdrin, should be applied in August or September.—PlZiekt. Dienst, Wageningen.

5200. LLOYD, N. C.
The light brown apple moth.
Agric. Gaz. N.S.W., 1960, **71**: 32-4.

The life history and control of *Tortrix postvittana* on pome fruits, stone fruits and grapes.

5201. MADSEN, H. F., AND FALCON, L. A.
New insecticides against orange tortrix tested on apples near Watsonville.
Calif. Agric., 1960, **14**(4): 5, 11, illus.

Of 6 insecticides tested 3 applications of TDE at 10·6 lb. 50% w.p. per acre gave best control.

5202. KELSEY, L. P., AND STEARNS, L. A.
Control of pear borer and American plum borer in apple trees.
J. econ. Ent., 1960, **53**: 276-8, bibl. 5.

In 1956 a serious attack of American plum borer (*Euzophera semifuneralis*) and pear borer (*Thamnosphecia pyri*) was observed on the trunks of 9- and 15-year-old apple trees. Sprays applied with an orchard boom gave unsatisfactory control, but when 15% parathion at 2 lb. w.p. or 1 pt. of 47·5% Paraflow emulsion (containing 4 lb. parathion per gal.) were applied at 400 p.s.i. with shade tree guns, perfect control was obtained, without reinfestation for 2 years.—Del. agric. Exp. Stat., Newark.

5203. MADSEN, H. F., AND SANBORN, R. R.
Two-spray program controlled western peach tree borer on apricots in Contra Costa County studies.
Calif. Agric., 1960, **14**(3): 10, 15.

Endrin and Thiodan at 0·5 lb. active ingredient/100 gal. or dieldrin at 1 lb./100 gal. gave consistently better results than the standard DDT treatment in several seasons. Two applications, 1 in mid-May, pre-harvest, and 1 in mid-July, post-harvest, spanned the long emergence period. Sevin was not effective.

5204. MOORE, D. H.
Thiodan, a promising chemical for control of the lesser peach tree borer.
J. econ. Ent., 1960, **53**: 321-2, bibl. 5.

Three applications of 3 lb. of Thiodan w.p., containing 25% active ingredient, per 100 gal. gave 93% control of *Synanthedon pictipes* on peaches.—Niagara chem. Div., Food Mach. and chem. Corp., Middleport, N.Y.

5205. BRUNSON, M. H.

Effect of parathion on parasites of oriental fruit moth cocoons and *Trichogramma minutum* in peach orchards.

J. econ. Ent., 1960, **53**: 304-6, bibl. 11.

Parathion reduced both cocoon and egg parasitism more than lead arsenate.

5206. MASON, E. C.

This pest can be a menace.

Grower, 1960, **53**: 1293-4.

The damage caused by and the life-history of the cherry bark tortrix [*Enarmonia formosana*] are outlined. Control has been achieved by painting affected branches or trees in spring with creosote, the loose bark having been previously scraped off. A 0·1% Dipterex spray (2 lb. 50% w.p. in 100 gal.) applied at high volume rates in mid-May, was almost as effective as creosote.—N.A.A.S. Labs. Kirton, Lincs.

5207. WILDBOLZ, T., AND STAUB, A.

Zur Bekämpfung des Pflaumenwicklers. **(The control of the plum tortrix moth.)**

Schweiz. Z. Obst- u. Weinb., 1960, **69**: 327-9, illus.

Discusses the timing of parathion or diazinon emulsion sprays, which gave good control of the pest in 1959.

5208. REICHART, G., AND SZALAY-MARZSÓ, L.

Az amerikai fehér szövőlepke elleni nagyüzemi védekezési kísérletek. **(Large scale experiments on the control of fall webworm.)** [Russian and German summaries 1¾ pp. each.]

Kísérl. Közlem., Sect. C, 1959, **52C**(1): 43-67, bibl. 11, illus.

The most economical and effective control of *Hyphantria cunea* on roadside mulberries was obtained by spraying with a 10% DDT oil emulsion or by wet dusting with 10% DDT.

5209. MICHELBACHER, A. E.

Controlling walnut worms.

Western Fruit Gr, 1960, **14**(4): 23-4, illus.

The larvae of the codling moth, *Carpocapsa pomonella*, the filbertworm, *Melissopus latiferreanus*, and the navel orangeworm, *Myelois venipars*, are described. Control of the codling moth may be obtained, where DDT tolerance is present, by 2 treatments with Guthion or Sevin, 6 to 8 weeks apart [see also *H.A.*, 29: 2341]. Maximum control of filbertworm was obtained by using Guthion just as the husks of the Payne variety started to crack, supplemented by prompt harvesting and rapid drying. Guthion had some suppressing action on the navel orangeworm but no direct chemical control has been developed.

5210. FALCHIERI, F.

Prove di lotta contro la psilla del pero. **(Control tests against pear psylla.)**

Inf. fitopat., 1960, **10**: 24-6.

Very satisfactory control of pear psylla was achieved on a small scale between 24 Sept. and 21 Oct. with 50% methyl parathion, 50% dimethylchloronitrophenyl thiophosphate and, to a slightly lesser degree, with 40% ethyl Guthion.

5211. BUA, G.

Una *Psylla* quasi sconosciuta dannosa al pero nella regione Trentino – Alto Adige. **(An almost unknown *Psylla*, harmful to pear trees in the region of Trentino and Alto Adige.)**

Inf. fitopat., 1960, **10**: 92-5, illus.

The pest may be either a mutant of *Psylla pyri* or a recently introduced form of *P. trimaculata*. Its virulence suggests a type which has developed resistance to the widely used phosphoric esters and chlorinated compounds. Preliminary tests with nicotine and rotenone products have given good control of the larvae. Control of the adults is extremely difficult, and the eggs are unaffected by polysulphides but are susceptible to oil sprays at 2 kg. per hl. of water.—Osserv. Mal. Piante, Bolzano.

5212. MINISTRY OF AGRICULTURE, LONDON.

Apple sawfly.

Adv. Leafl. Minist. Agric. Lond. **13**, revised 1959, pp. 5, illus.

Life history and control of *Hoplocampa testudinea*.

5213. DROZDOVSKIJ, E. M.

Coccids (Homoptera, Coccoidea) on top and small fruits in the Moscow region. [Russian.]

Izv. Timirjazev. seljsk. Akad., 1960, No. 1, pp. 193-208, bibl. 12.

The life cycles and feeding habits of 9 coccids are reported, including 3 types new to the Moscow region. Control of coccids on black currant cuttings may be obtained either by treatment for 3–5 min. in Thiophos emulsion (0·5-2%), a new preparation P.2(0·5%), DNOC (1% solution) or a mixture of DNOC with a diesel oil emulsion (0·5% DNOC + 2% oil) or by hot water treatment (50° C.) for 5 min.

5214. TSUGAWA, C., AND YAMADA, M.

Forecasting the outbreak of destructive insects in apple orchards. I. Forecasting the initial date of hatch in respect of the overwintering Comstock mealy-bug, *Pseudococcus comstocki* Kuwana, in Aomori Prefecture. [Japanese, with English summary 1 p.]

Reprint from *Jap. J. appl. Ent. Zool.*, 1959, **3**: 172-6, bibl. 11.

The date of hatch was closely correlated with the accumulated temperature above 9° C. from the 1 March to 20 May, and was also related to the start and peak of the blossom period. Mathematical equations relating these variables are given for 3 apple varieties. Insecticide applications should be made 10–14 days after the initial date of hatch. Tanglefoot painted on branches 2–3 days before hatching was also effective.

5215. Whitehead, V. B.
Insect enemies of the mealybug on grape vines.
Dec. Fruit Gr, 1960, **10**: 123-7, illus.

The life histories of ladybird beetles, parasitic wasps and green lacewings described.

5216. Kilpatrick, D. T.
San José scale.
J. Agric. S. Aust., 1959, **63**: 208-10, bibl. 3, illus.

Description, with recommended winter and summer spray programmes for use on pome and stone fruits.

5217. Philipp, W.
Folidol oil for controlling San José scale.
Höfchen Briefe, 1959, **12**: 317-20.

San José scale on apple and pear and certain other pome fruit pests, such as *Doralis pomi*, were almost completely controlled by 0·5% Folidol oil (an oleo-phosphoric ester product), applied during the period from the start of bud swelling to the mouse ear stage.—Inst. Crop Protection, Heidelberg.

5218. Philipp, W., and Schetters, C.
Merkmale der Blausäurewirkung nach Begasung der San-José-Schildlaus (*Quadraspidiotus perniciosus* Comst.). (**Characteristics of the action of hydrocyanic acid used to fumigate plants against the San José scale.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1960, **12**: 110-11, illus.

For a rapid test of imported nursery material at quarantine stations.

Other pests.

5219. Howitt, A. J.
Metaldehyde sprays or dusts control slugs.
Bett. Fruit., 1960, **54**(10): 6, 10 and 12.

In tests on strawberries, which are subject to severe slug damage in some seasons, metaldehyde sprays and dusts at the rate of 1 lb. actual metaldehyde per acre proved superior to baits. Conventional dusters and sprayers can be used, and, as captan and metaldehyde are compatible, a combined spray would be possible.

5220. Laflin, T., and English, W. S.
Bird damage to buds of fruit trees and bushes.
Exp. Hort., 1960, No. 3, pp. 13-20, bibl. 16.

It was established that bullfinches did the major damage in orchards in Kent and East Sussex, although house sparrows and other finches sometimes caused local damage. The methods of feeding, types of damage and relative susceptibility of varieties and sites were studied. The removal of adjacent cover usually reduced damage. Tree greases were the most effective repellent among many chemicals tested, but they were not easy to apply and often caused bark damage. Scaring devices, of which the most promising were those based on glint, only gave limited protection for a very short time. Shooting remained the most effective method of control.—N.A.A.S.

5221. Ministry of Agriculture, London.
The wood-pigeon.
Adv. Leafl. Minist. Agric. Lond. **165**, revised 1959, pp. 8, illus.

Including damage to vegetables and fruit and control measures.

Chemicals and their application.

(*See also* 4757-4768, 4786-4791, 4820, 5018, 5088, 5153.)

5222. Kulikov, A. I., and others.
Nitraphen, a new insecticidal, fungicidal and herbicidal preparation. [Russian, with English, German and French summaries ¼ p. each.]
Vestn. s.-h. Nauki, 1960, **5**(2): 123-4, bibl. 3.

Nitraphen (the sodium salts of the nitrification products of alkylphenols), followed by bordeaux mixture or in combination with other fungicides, has given good control of vine downy mildew, American gooseberry mildew, currant anthracnose and apple scab, and has also been effective as a dormant spray against orchard pests. Nitraphen has also given good control of broad-leaved weeds and dodder in some agricultural crops.

5223. Helson, V. A.
Effects of ryania and ryanodine on the apparent photosynthesis of McIntosh apple leaves.
Canad. J. Plant Sci., 1960, **40**: 218-24, bibl. 11.

The effects of ryania, ryanodine and ryanodine-free-ryania (powdered wood) were determined by following the CO_2 exchange of the leaves with an infrared gas analyser. After one application ryanodine decreased photosynthesis by 15%, but the photosynthesis had returned to normal within 7 days of treatment. Four applications of ryanodine at 10-day intervals caused no greater decrease in photosynthesis than was obtained by a single application. Ryania and powdered wood progressively reduced photosynthesis with each of four applications at 10-day intervals, until photosynthesis was reduced by 40%. These results indicate that ryanodine had no marked chemical effect on apple leaves, but heavy deposits of either ryania or powdered wood either shaded or interfered with the gas exchange of the leaves. The rates of photosynthesis of untreated apple leaves reached a maximum of 14·95 mg. CO_2 per sq. dm. per hour when the leaves were 92% of full leaf expansion but had decreased by the time the leaves were fully expanded and continued to decrease during senescence. [From author's abstract.]—Dep. Agric., Ottawa.

5224. TASCHENBERG, E. F., AND AVENS, A. W.
DDT deposits on grapes as affected by growth and weathering.
J. econ. Ent., 1960, **53**: 269-76, bibl. 24.

Disappearance of surface deposits of DDT on grapes was determined for sprays applied for control of the grape berry moth, *Paralobesia viteana* (Clem.). Methods of sampling grapes for these determinations are described. The results of analyses from 7 years are reported for samples collected in the period beginning immediately after application of the final spray and extending into the harvest period. A deposit of less than 7 p.p.m. was found at harvest when only two first-brood sprays were applied. While residues at harvest were below the tolerance for three sprays when no spreader-sticker was used, such a schedule gave poor insect control. With a spreader-sticker, in 6 out of 7 years the deposit of DDT was 17·0 to 22·8 p.p.m. immediately after the final spray application and 6·1 to 12 p.p.m. at the beginning of harvest. The contribution of each application to the deposit from a three-spray schedule was determined. Losses in amounts of deposits are given separately for growth and weathering. The former caused decreases averaging 27·7% in 4 years and weathering 37·2%. The influence of adhesives and of fungicides on the initial deposits and subsequent losses are reported. [Authors' abstract.]—N.Y. St. agric. Exp. Stat., Geneva.

5225. MITCHELL, J. E., AND MOORE, J. D.
The behavior and effectiveness of residues of Cyprex on apples.
From abstr. in *Phytopathology*, 1959, **49**: 546.

The nature and rate of degradation of Cyprex residues on leaves and fruit of McIntosh apples were studied using various spray schedules. The amount of scab present did not increase substantially until the residue had fallen below 1·0 μg./g. fresh weight of fruit, and then only when early sprays had been omitted to permit primary infection. The half-life of the residues varied from 7 days early, to 22 days late, in the season.

5226. FEURSENGER, M.
Determination of arsenical pesticide residues in apples. [German?]
Dtsch. LebensmittRdsch., 1959, **55**: 304-6, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-247.

Determinations of As residues on 26 consignments of imported and local apples showed that 15 samples contained more than 0·05 p.p.m.As, 4 more than 1 p.p.m. and 1 sample more than 4 p.p.m. Washing in water, or dipping in 1% HC1 for 1 minute followed by a water rinse, substantially removed the residue. A tolerance limit of 1 p.p.m. is recommended.

5227. FEUERSENGER, M.
Determination of cyanide residues in apples. [German?]
Dtsch. LebensmittRdsch., 1959, **55**: 277-80, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-194.

Cyanide retention after fumigation varies with variety, fumigant concentration and contact time. Fumigation with 0·5% HCN by volume for up to 1 hour, followed by airing of the fruit for not less than 48 hours, resulted in less that 2 p.p.m. cyanide being retained.

5228. TICHENOR, D. A., RODRIGUEZ, J. G., AND CHAPLIN, C. E.
Effects of certain pesticides on flavour of frozen strawberries.
Food Technol., 1959, **13**: 587-99, bibl. 10, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-247.

Frozen strawberries from plots which had been sprayed with each of 21 insecticides and 5 fungicides were judged for flavour. None of the pesticides imparted off-flavours to the fruit. Differences were distinguished in samples treated with Tedion, parathion, Thimet, malathion and Guthion, but were not considered to be off-flavours. Of the 5 fungicide-treated samples none was judged to be significantly different from the controls.

5229. GLASSCOCK, H. H. AND STOREY, I. F.
Small volume (concentrate) spraying of fruit trees. I. Experiments with undiluted lime sulphur.
MORETON, B. D., AND GOULD, H. J.
Idem. II. Experiments with insecticides.
Exp. Hort., 1960, No. 3, pp. 42-45 and 46-58, bibl. 5.

In experiments carried out for 2 years in 2 orchards of Cox and Worcester the application of small volume sprays of undiluted lime-sulphur at 6–7 gal./acre, with an average droplet size of 65 mμ gave a control of apple scab on the fruit at least as good as that by an equal number of high volume diluted sprays. Leaf scab was either absent or negligible in both orchards. Mildew (primary and secondary) was less on the concentrate plots in both orchards in the second year, presumably as a result of the first year's spraying. Fruit tree red spider mite was less in the concentrate plots in one orchard in one year. Leaf scorch, leaf drop and fruit drop were generally negligible in both treatments in both orchards. There were no differences in degrees of russeting. Scab, mildew and red spider were more severe on a few trees left unsprayed in the orchards than in any of the plots. On the other hand, fruit russeting was at least as marked, indicating that lime-sulphur was not the cause of this in either year. There were no apparent differences in crop weights during the first year, while in the second the yield was decreased in one orchard by the concentrate spray, there being no clear difference in the other. This decrease may have been due to spraying during the blossom period. [Authors' summary to 1st paper]. Experiments at 3 sites in 3 years have shown that some at least of the common apple pests and diseases can under some conditions be as well controlled by small volume sprays of 4–7 gal./acre as by conventional high volume spraying with 150–250 gal./acre. The two main difficulties encountered were precipitation of some mixtures of insecticides with 100% lime-sulphur and spray drift. [From authors' conclusions to 2nd paper.] The results of low-volume insecticidal treatment against numerous pests are reported.—N.A.A.S., Wye and Cambridge.

5230. Byass, J. B., and Weaving, G. S.
A low-pressure air-blast nozzle and its application to fruit spraying. II. Application factors in the use of concentrated fruit tree sprays. [French and German summaries 15 lines each.]
J. agric.Engng Res., 1960, **5**: 179-99, bibl. 4, illus.

The main consideration is the relative merits of low-volume spraying compared with concentrate. Comparison of application factors is made on the basis of a complete season's spraying of two 7-acre blocks of half-standard [apple] trees. Cover and dosage measurements were made on artificial leaves throughout the season, and deposits are also quoted for smaller trees in full leaf. It is concluded that, subject to biological control being satisfactory, a possible increase of up to 50% in working rates amply justifies the development of machines for applications of less than 20 gal./acre. [Authors' abstract.—For part I, see *H.A.*, 30: 3194.]

WEEDS AND WEED CONTROL

General.

(*See also* 4681, 4731, 4748, 4764, 5222, 6291, 6320, 6330.)

5231. Zonderwijk, P.
Onkruidbestrijding met chemische middelen. **(Weed control with chemicals.)** [English summary 1½ pp.]
Meded. PlZiekt. Dienst Wageningen **111**, revised 1959, pp. 223, illus., f.2.75.

This comprehensive and most useful handbook deals with weed control problems under the following headings:—(1) Selective herbicides, giving instructions on the use of the various contact and systemic materials. (2) The use of herbicides in various agricultural crops. (3) The use of herbicides in various horticultural crops (more than 50 different crops or types of plant being dealt with separately). (4) Weed control in grassland and lawns. (5) Weed control in forestry. (6) Chemical weed control in the maintenance of ditches and other waterways. (7) Non-selective herbicides. Appendices give descriptions of the more important weeds and their ecology, tabulated data on the susceptibility of various weeds to dinitro and hormone herbicides, advice on the control of particularly stubborn weeds, and the chemical formulae of organic herbicides. The handbook is well indexed under crops, herbicides and weeds.

5232. Lobay, W., and Goettel, A. W.
Weed control with chemicals.
Publ. Alberta Dep. Agric. **83**, 1960, pp. 22, illus.

Practical advice on choice and use of the common herbicides.

5233. Trevett, M. F., and Murphy, H. J.
A guide for the use of chemical weed killers in 1960.
Misc. Publ. Me agric. Exp. Stat. **639**, 1960, pp. 33, illus.

Practical recommendations, as previously [see *H.A.*, 29: 2368], for weed control in top and small fruits, vegetables, lawns and bulbs.

5234. Quaglia, A.
La lotta chimica contro le erbe infestanti. **(Chemical control of weeds.)**
Inf. fitopat., 1960, **10**: 177-87, illus.

The susceptibility of 22 weed species (including 4 grasses) to DNOC, 2, 4-D, CIPC, ATA and DPA is tabulated. Recommendations are made for weed control in asparagus, carrots, celery, parsley, fennel, onions, garlic, leeks, peas, beans, strawberries, spinach and bush and tree fruit crops.

5235. Linn, M. B., Slife, F. W., and Butler, B. J.
Prevent 2,4-D injury to crops and ornamental plants.
Circ. Univ. Ill. Coll. Agric. **808**, 1959, pp. 16, illus.

Symptoms of injury on various crops are described. The adjustment and handling of sprayers, nozzle design and herbicide formulations are discussed in relation to the prevention of injury.

5236. Schuldt, P. H., Limpel, L. E., and Lamont, D.
Crop tolerance and weed susceptibility of DAC-893, a new pre-emergence herbicide.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 42-3.

Two years' trials with DAC-893 (dimethyl-2,3,5,6-tetrachloroterephthalate) have shown it to be active against weeds before or shortly after their emergence. It is relatively inactive as a foliage spray and is said to be safe to handle. Susceptible and moderately susceptible weeds are listed. Tolerant crops included cabbages, gladioli, lima beans, onions, peas, turnips and tomato transplants.—From *Weed Abstr.*, **9**, No. 886.

5237. PETERSEN, H. I.
Årsoversigt for Statens Ukrudtsforsøg 1958. (**Annual Report of the Danish Institute for Weed Research, 1958.**) [English summary 1¼ pp.]
Tidsskr. Planteavl, 1960, **63**: 837-47, illus.

Among other items it is noted that a new hormone herbicide containing 4-chloro-2-methylphenoxypropionic acid has been tested and approved. The preparation was effective against *Galium aparine* and *Stellaria media*.

5238. (MCWHORTER, C. G., AND WOOTEN, O. B.)
Underground spraying kills weeds.
Agric. Res. Wash., 1960, **8**(11): 6-7, illus.

A tractor-mounted, 2-row, cultivator-sprayer is described for the sub-surface application of volatile herbicides. Considerably less of certain volatile chemicals is required for sub-surface spraying, since there is no loss due to surface evaporation.

Control of aquatic weeds.

5239. NEURURER, H,, AND SLANINA, K.
Chemische Bekämpfung unerwünschter Teichpflanzen mit besonderer Berücksichtigung der Fischtoxizität von Herbiziden. (**The chemical control of undesirable pond plants, with special reference to the toxicity of herbicides to fish.**) [English summary 23 lines.]
PflSch. Ber. Wien, 1960, **24**: 139-62, bibl. 28, illus.

In tests with several herbicides, both in the laboratory and in open water, aquatic weeds, primarily *Myriophyllum verticillatum*, were controlled by 18 mg. Cutralin (ATA + TCA + 2,4-D) per litre without danger to fish.

5240. PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
Chemische bestrijding van waterplanten. (**Chemical control of water plants.**)
Fruitteelt, 1960, **50**: 539-40, illus.

Recommendations on the use of dalapon, MCPA and 2,4-D amine for control of grasses and broad-leaved weeds in ditches.

5241. FLANAGAN, J. H.
A review of simazine for aquatic weed control.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 502-5.

See *Weed Abstr.*, **9**, No. 855.

5242. GREELEY, J. R.
A new 2,4-D amine pellet for eradication of water chestnut.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 488-95.

Pelleted 2,4-D (amine) at 5 lb./ac. applied before flowering is recommended for control of water chestnut (*Trapa natans*). Sprays were generally less effective, but the addition of triethanolamine (of high specific gravity) increased the effect of an amine spray. *Ceratophyllum* was only temporarily affected by the granular formulation and there was little or no effect on *Sagittaria* or *Potamogeton*.—N.Y. St. Conserv. Dep., Albany.—*Weed Abstr.*, **9**, No. 857.

Weed control in temperate fruit crops.

(*See also* 4997, 5119, 6317, 6331.)

5243. CHAPPELL, W. E., AND WILLIAMS, G.
Weed control studies in young apple orchards.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 217-18.

After 1 year no apparent injury was caused to maiden apple trees by applications after planting and discing of simazine granular at 3 lb./ac., simazine spray at 3 lb./ac. + amitrol at 1 lb./ac. or + dalapon at 5 and 10 lb./ac., diuron granular at 2 lb./ac., amitrol at 8 lb./ac., and amitrol at 5 lb./ac. + dalapon at 10 lb./ac., or to 3-year-old trees by applications after discing of amitrol at 4 lb./ac., + dalapon at 5 lb./ac., amitrol at 5 lb./ac. + dalapon at 10 lb./ac., 1-chloro-N′-(3,4-dichlorophenyl)-N, N-dimethyl formenmicine [sic] at 8 lb./ac. in 60 gal. fuel oil/ac., and Dow General (dinoseb 55%) 1·5 pints in 5 gal. oil + 45 gal. water/ac. + amitrol at 1 lb./ac. and amitrol at 2·8 lb./ac. + simazine at 7·4 lb./ac.—Va agric. Exp. Stat., Blacksburg,—From *Weed Abstr.*, **9**, No. 823.

5244. SCHUBERT, O. E.
Evaluation of five herbicides for killing established poison ivy in an apple orchard one and two years following a single treatment.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 219-20.

After 2 years poison ivy (*Rhus radicans*) was still greatly reduced by the following herbicides (in order of effectiveness), all at 4 lb./ac., except AMS which was at 150 lb./ac., in 200 gal./ac.: amitrol, 2,4,5-T (ester), 2,4,5-TP, AMS, 2,4,5-T (amine). [For earlier work, see *H.A.*, 30: 2041.]—W. Va Univ., Morgantown.—*Weed Abstr.*, **9**, No. 885.

5245. ANON.
Control of couch grass.
Orchard. N.Z., 1960, **33**: 84.

Control was obtained using TCA at 4 oz. per tree without injury to peach and plum trees, but leaf chlorosis and necrosis occurred on apricot trees. Dalapon at 5 or 10 lb. per acre allowed only weak regrowth without tree injury.

5246. Gambrell, C. E., and Rhodes, W. H.
Effect of Dowpon on bermuda grass in peach orchards.
Down to Earth, 1960, **15**(4): 11-12, illus.

Repeated applications of Dowpon at 1 lb. in 40 gal. or in 20 gal. gave excellent control of bermuda and crab grasses with little or no injury to the trees.—Sandhill Exp. Stat., Columbia, S.C.

5247. Bailey, J. S.
Weed control in cultivated blueberries with diuron.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 49-54.

Diuron at about 3 lb./ac. applied in the spring or autumn gave good weed control in blueberries. Tolerant and sensitive varieties are listed. There was some indication that young plants may be more tolerant than old plants.—Univ. Mass., Amherst.—From *Weed Abstr.*, **9**, No. 821.

5248. Bailey, J. S., and Lord, W. J.
Control of the common bracken, *Pteridium aquilinum* L., in low bush blueberries with polyborchlorate.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 60-5, bibl. 2.

Experiments over 8 years show 400 lb./ac. to be adequate.—From *Weed Abstr.*, **9**, No. 894.

5249. Trevett, M. F.
Control of sweet fern and poplar in lowbush blueberries by contact application of 2,4-D and 2,4,5-T.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 221-6, bibl. 2.

The contact applicator used consisted of flannel blanketing tacked over a wooden frame 8 ft. long and 3 ft. wide. This was wetted with the solution and carried by 2 men walking abreast who swung it forwards and backwards, low enough to contact most weeds and high enough to miss most blueberry bushes. As with spray treatments, early season application (June) was more effective than late (August or September) for control of *Comptonia peregrina*, *Populus tremuloides* and *P. grandidentata*.—Me agric. Exp. Stat., Orono.—From *Weed Abstr.*, **9**, No. 822.

5250. Rakitin, Ju. V., and Gejden, T. M.
Chloro-IPC as an effective means of controlling chickweed. [Russian.]
Fiziol. Rast., 1960, **7**: 232-4, bibl. 12.

In the greenhouse 0·625 kg./ha., and outdoors 1·25-2·5 kg./ha., of chlorpropham were needed to kill *Stellaria media*. In field experiments a pre-emergence treatment gave complete control of chickweed, reduced the number of other weeds and greatly increased onion yields. Chlorpropham sprayed onto cultivated soil at 20 kg./ha. under black currants and then lightly worked in practically eradicated chickweed and suppressed couch grass [*Agropyron repens*] and other weeds, without affecting the growth and yield of the currants.

5251. Stettmeier, W.
Erfahrungen mit Simazin im Gartenbau. **(Experiments with simazine in horticulture.)**
Pflanzenschutz, 1958, **10**: 123-4, from abstr. in *Beerenobstschrift.*, 1959, No. 17, p. 3.

Simazine, even at 10 kg./ha, did not damage raspberries and at 2 kg./ha. gave good control of annual weeds. In older currant plantations rates of 2 and 4 kg./ha. were effective.

5252. Hamilton, G.
Weed-free strawberries.
Amer. Fruit Gr, 1960, **80**(3): 28, illus.

Effective control of crab grass and broad-leaved weeds has been obtained by the use of a granular formulation of 2,4-D, called R-H Weed Rhap-20.

5253. Rahn, E. M., and Fieldhouse, D. J.
Evaluation of several herbicides for strawberries.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 55-9, bibl. 7.

In trials with the variety Pocahontas, neburon granular at 4 lb./ac. and EPTC granular at 5 lb./ac. applied to the surface of newly cultivated soil were outstanding for the degree and duration of weed control and lack of crop injury. EPTC gave excellent control of *Cyperus esculentus*. Neburon gave no control of *C. esculentus* but better control of annual weeds than EPTC. Although 3 applications of neburon were made, 2 would probably have sufficed for a full season's weed control.—Del. Univ. School Agric., Newark.—From *Weed Abstr.*, **9**, No. 824.

5254. Stryckers, J.
Stellaria media (L.) Vill., muur, in laagstamboomgaarden, met onderteelt van aardbeien. **(Chickweed in low-worked orchards intercropped with strawberries).**
Belg. Fruit Rev., 1959, **11**: 3-4, illus.

The only safe and effective herbicides to use under these conditions are IPC (at 6 kg./ha. active ingredient) or better still CIPC (at 2-3 kg./ha. a.i.), applied in October or November.—Rijkslandb-Hogesch., Gent.,

5255. Pearce, G. A., and Jamieson, W. R.
Weed control in the vineyard.
J. Agric. W. Aust., 1960, **1**: 309-19, illus.

Advantages of chemical herbicides over "strip digging" outlined and recommendations tabulated.

5256. Shaulis, N., and Crowe, D.
New York trials in weed control over the whole vineyard floor.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 66-70, bibl. 3.

Experiments in Concord grapes, 4, 10 and 50 years old, indicated that April applications of monuron or diuron at 4 lb./ac. will give adequate season-long weed control and could be an acceptable substitute for inter-row tillage. Diuron caused no chlorosis; monuron caused some chlorosis in one trial, but yield and vigour were not apparently affected.—N.Y. St. agric. Exp. Stat., Geneva,—*Weed Abstr.*, **9**, No. 820.

5257. Meadows, M. W., Shaulis, N., and Flagg, C. V.
Bindweed control in Concord grapes 1957-9.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 71-6, bibl. 2.

The following results were obtained from trials over 3 years in mature Concord grapes: (1) 2,4,-D (amine and acid), applied at 3 lb./ac. in July, caused leaf malformation both in the sprayed area and from drift at up to 150 ft. distance; with the acid, volatility also caused damage at 50 ft. distance; (2) Diax (2,4-D isopropylamine 93% citric acid 7%), applied for 3 consecutive years in August or September at 1 and 2 lb./ac., gave excellent control of *Convolvulus sepium* without affecting yields or soluble solids of grapes; (3) rates of 2 lb./ac. and over of TBA were too injurious for use in grapes; (4) TBA, applied at 0·2–0·8 lb./ac. in late August when the berries were nearly full grown, caused practically no leaf malformation, whereas July application (when berries were small and shoot growth rapid) caused considerable injury; however, direct application in late August on a few leaves caused berries on that shoot to fail to ripen; (5) TBA, applied at 0·2 and 0·4 lb./ac. in late August failed to control *C. sepium*, but applied at 0·8 and 1 lb./ac. it gave excellent control without affecting grape yields, berry size or soluble solids; (6) late August applications of TBA at 0·7 lb./ac. to the same plot for 3 consecutive years gave almost complete control of *C. sepium* without adverse effect on grape yields, and at 0·35 lb./ac. it gave considerable control. The best control of *C. sepium* was obtained when the entire plant was sprayed. TBA resulted in little or no damage to adjacent vines. [For earlier work see *H.A.*, 29: 342.]—From *Weed Abstr.*, **9**, No. 818.

Weed control in ornamentals.

(*See also* 5880, 6317.)

5258. Say, J. S.
Chemical weed control in nurseries.
N.Z. J. Agric., 1960, **100**: 121-3, illus.

Rooted cuttings, seedlings of trees and shrubs, and some herbaceous perennials were treated with monuron (2 lb./acre), diuron (2 lb.) CIPC (4 lb.), and 2,4-DES (5 lb.). These were applied to strips 1 ft. wide on each side of the rows, making no attempt to avoid the young plants. Applications were made in early summer and autumn to observe the effect on summer and winter weeds. No detrimental effects on the plants were observed. Monuron and diuron suppressed all summer weeds, including *Portulaca*, for 4 months, only scattered weeds being present for a further 2 months, and also controlled winter weeds, including *Poa annua*, for up to 3 months. Good control of summer weeds and complete control of spurrey were obtained for 2½ months with CIPC. It also gave excellent control of winter weeds, including *Poa annua*, for 2 months. 2,4-DES did not give control in the first year but was fairly successful in the second.—Dep. Agric., Auckland.

5259. Runge, G. F.
Nursery weed control.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 165-7.

Simazine at 4, 6 and 8 lb./ac. controlled many weed species without injuring a large number of woody ornamentals in the nursery. Applications made in November or December were more effective than those made in April or June. Results are also given of treatments with neburon, diuron and atrazine, all granular, and with amitrol.—Mich. St. Univ., E. Lansing.—From *Weed Abstr.*, **9**, No. 826.

5260. Bing, A.
Observations on weed control experiments in nursery and cut flower crops during 1959.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 137-41, bibl. 5.

For injury caused to some woody and herbaceous ornamentals and degrees of weed control obtained in them by various rates and formulations of simazine, diuron, EPTC, atrazine, chlorpropham and neburon see *Weed Abstr.*, **9**, No. 816.

5261. Ahrens, J. F.
Chemical control of weeds in *Taxus* liners.
Proc. 14th N.E. Weed Control Conf. 1960, pp. 155-60.

For results of pre- and post-planting treatments on weed control and the reaction of 3 varieties of *Taxus cuspidata* see *Weed Abstr.*, **9**, No. 814.

5262. Pridham, A. M. S.
Crop, weed and soil aspects of simazine, atrazine and other herbicides in greenhouse and field tests.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 142-7.

Including degree of injury caused by simazine to gladiolus, *Taxus* spp., *Forsythia intermedia*, *Euonymus fortunei*, *Iberis sempervirens*, *Pachysandra terminalis* and *Vinca minor*.—Cornell Univ.—From *Weed Abstr.*, **9**, No. 813.

5263. Harrison, M. R., Meggitt, W. F., and Dupras, C. A.
Control of annual weeds in azaleas with granular herbicides.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 161-4.

Granular EPTC and dinoseb at 5 lb./ac., chlorpropham at 8 lb./ac. and CDEC at 6 lb./ac. were applied to 7 azalea varieties at a time when no weeds were visible. Chlorpropham and dinoseb gave good weed control for 5-6 weeks; CDEC and EPTC gave poorer control. Six weeks later weeds were fewer but grew taller, thus reducing the time taken for hand weeding from 16 man-hours for the control to 1·5 man-hours. The only injury to azaleas observed was a slight chlorosis of the variety Hinodegiri caused by EPTC; these plants also developed a deeper root system with fewer surface roots than the controls.—New Brunswick St. Univ., N.J. —From *Weed Abstr.*, **9**, No. 815.

5264. THODE, F. W.
Dowpon as an aid to maintenance of home grounds.
Down to Earth, 1960, **15**(4): 21.

To control grass under ornamentals and on paths.

5265. SALINGER, J. P.
Chemical weed control in bulbs.
N.Z. J. Agric., 1960, **100**: 393-6, illus.

Soil sterilants, contact weedkillers used after planting and before bulb emergence, and seed germinant weedkillers are discussed.

5266. LISSE, PROEFSTATION VOOR BLOEMBOLLENCULTUUR.
Wat doen we met het kruiskruid. **(What we do with groundsel.)**
Weekbl. BloembollCult., 1960, **70**: 634.

The only safe herbicide for bulb crops is CIPC, but in controlling chickweed it encourages the spread of the resistant groundsel (*Senecio vulgaris*), for which, at present, there is no other means of control than mechanical or hand weeding.

5267. HOOGETERP, P.
Chemische onkruidbestrijding bij de teelt van bloembollen. **(Chemical weed control in bulb crops.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1960, **23**: 315-22, bibl. 3.

In extensive trials on narcissi, tulips and hyacinths over a period of 4 years yields were not affected by the application of CIPC at 1·6 and 3·2 l. per ha. in the spring and autumn. Many weeds were controlled by 1 application at the lower rate, but chenopodium required either 2 applications at the lower rate or 1 application at the higher rate. Groundsel was resistant to CIPC. One application of CIPC in the spring gave 70-80% weed control (excluding groundsel), one application in autumn gave 50%, and 2 applications in spring, or 1 in spring and 1 in autumn, gave 80–90% weed control [See also *H.A.*, 29: 2387]. Fenuron and monuron damaged the crops. Groundsel and other weeds could be controlled by adding 500 g. simazine to the CIPC spray without damage to the crops.—Proefst. Bloembollencult., Lisse.

5268. HOOGETERP, P.
De onkruidbestrijding in gladiolen. **(Weed control in gladioli.)**
Weekbl. BloembollCult., 1960, **70**: 740.

Notes are given on rates and conditions of application of 3 mixtures:—PCP in oil plus CIPC; MCPA plus CIPC; and DNOC plus CIPC. The new herbicide Tri-PE (based on xanthogen sulphide) at 25 l./ha. has given promising results in gladioli and freesias, its action being comparable with that of PCP in oil. It can be mixed with CIPC.—R.T.C., Lisse.

5269. BING, A.
A comparison of some herbicides on flowering and corm yields of gladiolus variety Friendship.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 148-54, bibl. 2.

Data on responses to atrazine, diuron, dinoseb and simazine.—From *Weed* Abstr., **9**, No. 817.

5270. BING, A.
What you should know about weed control.
Bull. N.Y. St. Flower Grs, 1960, No. 169, pp. 1, 4.

The flower yields of gladioli and chrysanthemums grown in weedy plots were much lower than those of hand weeded plots. Methods of weed control recommended in greenhouses include: steam heating the soil to 180° F. for 30 min.; fumigating the soil at temperatures of over 50° F. with methyl bromide (1 lb. gas per 100 sq. ft.); injecting chloropicrin into warm soil (about 65° F.), with a 2-week interval before planting; applying a Vapam (1 quart/100 sq. ft.) drench in 15–50 gal. water/100 sq. ft. at soil temperatures of 55–80° F. with a waiting period of 3 weeks; and applying Mylone (13 lb. 50% dust/ 1,000 sq. ft.) at soil temperatures of 60–90° F. with a 3-week interval before planting. Treatments recommended for weed control in individual ornamental crops are outlined.

Weed control in turf.

5271. SCHERY, R. W.
Weeding lawns.
Gdn J. N.Y. bot. Gdn, 1960, **10**: 95-7, illus.

Notes on weeds and advice on herbicides.

5272. GIORDANO, P. M., AND DEFRANCE, J. A.
Chickweed control in lawn turf with chemicals.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 300-3.

Ammonium methyl arsonate (1) + 2,4,-D, (1) + 2,4,5-TP + 2,4,D, and (1) + 2,4,5-TP each at 43·56 lb./ac., and 2,4,5-TP and 2,4-D on vermiculite, all gave more than 80% control of *Cerastium vulgatum;* 2,4,5-T and N-(3,4-dichlorophenyl)-2-methyl pentanamide at 2 lb./ac. gave 55 and 64·3% control respectively. Results obtained with N-(3-chloro-4-methylphenyl)-2-methylpentanamide at 4 lb./ac. were inconsistent. Very slight turf discolouration was caused by the 3 ammonium methyl arsonate mixtures and the 2 pentanamide compounds.—R.I. agric. Exp. Stat.—From *Weed Abstr.*, **9**, No. 808.

5273. Rice, E. J., and DeFrance, J. A.
Post-emergence crabgrass control with chemicals in lawn turf.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 284-7, bibl. 4.

Herbicides were applied when crabgrass (*Digitaria ischaemum*), infesting Colonial bentgrass turf, was in the 3–4-leaf stage and 12 days later. PMA (10%) at 6·75 lb./ac. gave 90% control and caused slight discolouration of turf after the first application, and gave 92% control and slightly increased discolouration after the second application. Octyl ammonium methyl arsonate (8%) + dodecyl ammonium methyl arsonate (8%) gave 54 and 73% control with 1 or 2 applications respectively at 10·89 lb./ac., and 99% after both applications at 21·78 lb./ac. Disodium methyl arsonate (44%) at 7·35 and 14·43 lb./ac. and disodium methyl arsonate hexahydrate (2·5%) at 9·8 and 19·6 lb./ac. all gave over 91% control after each application and only caused very slight turf discolouration. Other treatments were less effective against crabgrass. [For earlier work see *H.A.*, 30: 2067.]—R.I. agric. Exp. Stat.—From *Weed Abstr.*, **9**, No. 810.

5274. Engel, R. E., and Meggitt, W. F.
A progress report of pre-emergence crabgrass control on lawnturf.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 304-7.

Chemical treatments were applied in March, before the germination of crabgrass (*Digitaria* spp.), to a turf which was predominantly Kentucky bluegrass. The number of crabgrass seedlings counted in July was approximately 250 on the control plots, but was less than 80 on plots treated with chlordane at 80 lb./ac., calcium arsenate (73%) at 350, 535 and 700 lb./ac., calcium arsenate (70%) at 525 lb./ac., Dachthal (dimethyl-2,3,5,6-tetrachloroterephthalate) at 6, 9 and 12 lb./ac. and Zytron on vermiculite at 20 lb./ac. Chlordane at 40 lb./ac. and Zytron emulsion at 20 lb./ac. gave similar counts to the control plots, and lead arsenate at 871 lb./ac. gave intermediate results.—N.J. agric. Exp. Stat., New Brunswick.—From *Weed Abstr.*, **9**, No. 807.

5275. Duich, J. M.
Pre-emergence crabgrass results in Pennsylvania—1959.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 268-70.

A 3-year-old stand of Kentucky bluegrass was seeded with crabgrass (*Digitaria sanguinalis* and *D. ischaemum*) and then on 3 different dates was treated with 4 solid and 4 liquid herbicides. Very good crabgrass control was obtained with Zytron at 13 lb./ac. in 90 gal. and calcium arsenate at 16 lb./M [1,000 sq. ft. ?] mixed with soil and applied by hand. When the plots were infected by leaf spot, dollar spot and red thread diseases following the period of treatment, none of the herbicides showed evidence of disease control, and treatment with Pax contributed to greater leaf spot infection owing to overstimulation of the turf from the soluble nitrogen Pax contains.—Pa St. Univ.—From *Weed Abstr.*, **9**, No. 806.

5276. Schmidt, R. E., and Chappell, W. E.
Crabgrass control studies in turf.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 278-83.

When an established turf of Kentucky bluegrass and creeping red fescue was treated in the autumn, winter and spring, in each case before the emergence of crabgrass, the best control, 50–60%, was given by neburon at 6 lb./ac. applied in the spring. In a second trial of spring treatments, crabgrass control was excellent with 0-2,4-dichlorophenyl-O-methyl isopropylphosphoramdiothioate at 20 lb./ac., calcium arsenate granular at 645 and 860 lb./ac. and 2,3,5,6-tetrachloroterephthalate at 12 lb./ac.—Va agric. Exp. Stat., Blacksburg.—From *Weed Abstr.*, **9**, No. 812.

5277. Santelmann, P. W., and Meade, J. A.
Pre-emergence crabgrass control in lawns.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 288-91.

A well established Kentucky bluegrass lawn was treated with chemicals before crabgrass (*Digitaria* spp.) emergence in the spring and autumn of 1958 and the spring of 1959. In general, chlordane 10% granular at 70 lb./ac. gave better crabgrass control than chlordane 72% emulsifiable concentrate; spring treatment appeared better than autumn treatment when granular chlordane was used, but not with the emulsifiable concentrate. Fenac at 4 and 6 lb./ac. gave 38% control when applied in the spring and caused slight turf injury. Pax at 1,080 lb./ac. gave about 80% control but caused severe turf injury. DAC-893 at 5 and 10 lb./ac. and Zytron, granular and emulsion, at 15 and 20 lb. gave good crabgrass control (liquid Zytron being slightly better than granular) and caused no turf injury. In an experiment in which Kentucky bluegrass and ryegrass were seeded either 2-3 weeks before or after chemical application, or on the same day, ryegrass was more resistant to chlordane and fenac than bluegrass.—Md. agric. Exp. Stat.—From *Weed Abstr.*, **9**, No. 811.

5278. Mower, R. G., and Cornman, J. F.
Pre-emergence and post-emergence crabgrass control.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 271-7, bibl. 1.

Treatments were applied in October and April, before crabgrass (*Digitaria* spp.) germinated, to a uniform turf of Kentucky bluegrass and red fescue. Results for autumn and spring applications were similar for the following: lead arsenate at 800 lb./ac. 91–86% control of crabgrass; calcium arsenate at 480 lb./ac. 90–98%; chlordane (72% emulsion) at 60 lb./ac. a.i. 73–83%; chlordane (granular) at 60 lb./ac. a.i. 72–68%; Pax (arsenical + fertilizer proprietary) at 1,000 lb./ac. 89–83%; chlordane (vermiculite proprietary) at 250 lb./ac. a.i. 53–68%; and DAC-893 (dimethyl-2,3,5,6-tetrachloroterephthalate) at 12 lb./ac. a.i. 100–98%. None of these treatments injured the turf except DAC-893, which caused severe injury to the red fescue, and Pax, which caused patches of dead turf and overall browning. When treatments were applied to crabgrass in the 2-leaf stage and followed by 4 weekly applications more than 85% control was obtained with disodium mon-ethyl arsonate 15·7% at 1·57 oz., octyl ammonium methyl arsonate 8% + dodecyl ammonium methyl arsonate 8% at 0·60 oz., PMA 10% at 0·20 oz., PMA 6·7%+2,4-D 4·4% at 0·20 oz. and potassium cyanate at 5·0 oz., all per 1,000 sq. ft.—Cornell Univ.—From *Weed Abstr.*, **9**, No. 809.

Weed control in vegetables.

(*See also* 5250, 6293, 6296, 6310.)

5279. Beeson, M. M.
Weed control in vegetables.
N.Z. J. Agric., 1960, **100**:141.

CIPC may be applied at 4 lb./ac. immediately after sowing onions, lettuces and carrots or before planting lettuces. The amine salt of dinoseb may be used at 2–4 lb./ac. on dwarf or climbing beans as a pre-emergence or immediately post-emergence herbicide, the lower rate being used on warm days (70° F.). A coarse spray of dinoseb may be applied at 3 lb./ac. to peas before they are 10 in. high. MCPB is more effective than dinoseb in peas, if Californian thistle or docks are present. In asparagus successful control of couch grass has been obtained by an autumn application of dalapon at 5 lb./ac.; broad-leaved weeds may be controlled by either monuron or MCPA at 1–2 lb./ac.—Dep. Agric., Wellington.

5280. Lachman, W. H., and Michelson, L. F.
Weed control in certain vegetable crops, 1959, (a progress report).
Proc. 14th N.E. Weed Control Conf., 1960, pp. 196-200.

Good weed control with high crop yields was given by CDEA at 4 lb./ac. post-emergence in spinach; CDEA at 6 lb./ac. or CDEA at 3 lb./ac. + chlorpropham at 2 lb./ac. in lettuce one day after planting; Niagara 4512 (N-(3-chloro-4-methylphenyl)-2-methylpentanamide) at 4 lb./ac. post-emergence in tomatoes; ipazine at 2 lb./ac., Niagara 4562 (N-(3,4-dichlorophenyl) pentanamide) at 4 lb/ac. and Stoddard Solvent 100 gal./ac. in carrots (only broadleaf weeds controlled); a second treatment with Niagara 4562 at 4 lb./ac. after 13 days controlled crabgrass (*Digitaria* spp.). In asparagus fairly good weed control (except *Digitaria*) without crop damage was given by atrazine at 7·5 lb./ac., EPTC at 8 lb./ac. and simazine at 8 lb./ac. Results with CDEA, CDAA and endothal in beets were promising. Fair weed control without damage to onions was given by CDEA at 6 lb./ac. + chlorpropham at 4 lb./ac., and CDAA (Randox T-15) at 3 gal. or (Randox T-25) at 5·25 gal./ac. Treatments causing crop injury or giving unsatisfactory weed control are also mentioned.—Mass. agric. Exp. Stat., Amherst.—From *Weed Abstr.*, **9**, No. 797.

5281. Kozaczenko, H.
Chemiczne zwalczanie chwastów w roślinach warzywnych. (**Chemical weed control in vegetable crops.**) [English and Russian summaries 2 pp. each.].
Biul. Warzyw., 1959, **4**: 125-53, bibl. 13.

The most effective herbicides for the following crops were: *Onions:* (a) petroleum at 3 kg./are just before appearance of the seedlings; (b) 30% DNC at 1–1·5% in 20 l./are before germination; or (c) calcium cyanide at 1–1·5 kg./are after emergence. *Seed onions:* 0·1% 2,4-D at 10–20 l./are after the seed stalks are 25 cm. high. *Carrots:* (a) 50% DNC at 0·2% in 20 l./are 1 week after emergence; (b) naphtha 1 week after emergence at 2 kg./are along the rows only. *Peas:* (a) 30% DNC at 2% in 20 l./are before emergence; (b) 1% Cresotol at 20 l./are before emergence; (c) 1% Sevtox at 8 l./are 1 week after germination. *Asparagus:* 0·1% 2,4-D at 20 l./are after harvesting.

5282. Dallyn, S. L., and Sawyer, R. L.
Progress report on weed control in tomatoes, peppers, carrots, onions and cauliflower.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 107-10.

Tomatoes: When applied about 3 weeks after transplanting, particularly promising results were given by EPTC (granular, incorporated into the soil) at 4 lb./ac. and Niagara 4512 at 4 lb.; simazine granular at 1 lb. also appeared promising. *Peppers:* When applied as in tomatoes much the best results were given by Dinoben and EPTC each at 4 lb. *Carrots:* Compared with the hand weeded control, yields were not significantly affected by applications at sowing of Amiben (liquid or granular) at 4 lb., Dinoben (granular) at 4 lb., Niagara 4556 and 4562 each at 2 or 4 lb., chlorpropham at 4 lb. (this gave the highest yield), or by post-emergence (3 weeks after sowing) applications of Stoddard Solvent at 75 gal. and Niagara 4556 and 4562 each at 2 or 4 lb. *Onions:* Lay-by treatment with EPTC at 4 or 6 lb. (incorporated) gave complete control of grasses without affecting crop yield or quality. Foliage affected by the spray was rendered more susceptible to purple blotch. *Cauliflower:* Amiben (granular) at 4 lb. and DAC-893 at 3 and 6 lb. applied 2 weeks after transplanting gave good weed control with no crop injury.—Cornell Univ.—From *Weed Abstr.*, **9**, No. 804.

5283. SWEET, R. D., RUBATZKY, V., AND CIALONE, J.
Comparisons of EPTC and several analogs for weed control and vegetable crop tolerance.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 113-22, bibl. 14.

EPTC, propyl dipropylthiolcarbamate (1607), allyl dipropylthiocarbamate (1862), ethyl diallylthiolcarbamate (2007), ethyl ethylbutylthiolcarbamate (2060), propyl ethylbutylthiolcarbamate (2061) and ethyl allylpropylthiolcarbamate (2181) were compared (1) on beets, carrots, lettuce, spinach, sown and transplanted tomatoes, transplanted cabbage, sweet corn and snap beans; (2) for the control of nutgrass (*Cyperus* sp.); (3) for general weed control; and (4) for residual activity in the soil. The best control of annual grasses and broadleaved weeds was given by 1607; all compounds gave commercial control of nutgrass when incorporated early in the season. 2060 and 2061 were less toxic to beets, spinach, sweet corn and sown tomatoes than EPTC or 1607. The residual effects of EPTC and 1607 were such as to be of importance for crops following spring or autumn applications.—Cornell Univ.—*Weed Abstr.*, **9**, No. 795.

5284. DALLYN, S. L., AND SAWYER, R. L.
Results with eptam on several vegetables.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 125-8, bibl. 2.

EPTC at 2, 4 and 6 lb./ac. was incorporated 3–4 in. deep in the soil the day before sowing beets, snap beans, lima beans, carrots, sweet corn, cucumbers, lettuce, muskmelons, onions, peas, spinach, cabbages, cauliflowers, tomatoes and peppers. Cauliflowers, cabbages, tomatoes and peppers were also sown or transplanted into the treated soil at intervals up to 15 days after application. Only snap beans, sweet corn, carrots and beets showed considerable tolerance, and only snap beans showed no injury from the highest rate (which gave complete weed control). The bloom on cauliflower and cabbage leaves was completely absent and the plants showed formative effects. Rye sown 4 months later was severely affected by the highest rate.—Cornell Univ.—From *Weed Abstr.*, **9**, No. 769.

5285. THOMPSON, F. B.
Weed control in brassica crops.
N.Z. J. Agric., 1960, **100**: 124, illus.

Satisfactory control of willow weed, redroot, spurrey and nightshade was obtained by using the Na salt of monochloracetate (MCA) at 15 lb./ac. If fat hen or grassy weeds are present, which are resistant to MCA, it should not be used as these weeds may dominate the brassica crop.—Rukuhia Soil Res. Stat.

5286. SYTSMA, R.
Chemische onkruidbestrijding bij de zaadteelt van sluitkool. (**Chemical weed control in seed cabbage.**)
From abstr. in *Tijdschr. PlZiekt.*, 1960, **66**: 130.

The most promising herbicide tested was simazine. When this was applied in autumn and spring, either with or without earthing up, the crop was kept free from weeds until harvest time.

5287. SHADBOLT, C. A., BRENDLER, R. A., AND HALL, B. J.
Use of herbicides in transplanted celery in southern California.
Calif. Agric., 1960, **14**(4): 6-7.

With pre-planting treatment satisfactory weed control was obtained with neburon at and above 2 lb. per acre, with simazine at ½ lb., and with CIPC at 8 lb. plus Stoddard Solvent at 20 gal. per acre. Nearly complete weed control was obtained in all post-planting treatments with neburon at 1 to 6 lb. per acre, simazine at ½ lb., CIPC at 2 to 8 lb. plus Stoddard Solvent, and CDEC at 4 to 8 lb. plus Solvent per acre. Pre-planting treatments did not cause any marked injury, but post-planting treatments, with the exception of CDEC, did tend to cause injury or reduce yield.—Univ. Calif., Riverside.

5288. ASHTON, F. M., ALDRICH, T. M., AND DUNSTER, K. W.
Use of herbicides in transplanted celery in northern California.
Calif. Agric., 1960, **14**(4): 7, illus.

In pre-transplant trials weed control was 90% or higher with CDEC, CIPC and neburon at 8 lb. and with simazine at 1 lb. per acre. However, only neburon did not reduce yields. Weed control exceeding 90% from post-transplant treatments was obtained with CIPC at 6 lb. plus 20 gal. selective oil and with Dicryl (N-4556) and Karsil (N-4562) both at 1·5 lb. per acre. Those 3 treatments did not reduce yield or vigour.—Univ. Calif., Davis.

5289. MINISTRY OF AGRICULTURE, LONDON.
Chemical weed control in onions and leeks.
Adv. Leafl. Minist. Agric. Lond. **477**, 1959, pp. 5.

Contact pre-emergence, residual pre-emergence and post-emergence sprays listed.

5290. ANON.
Herbicida eficaz y económico en cebolla. (**An effective and economic herbicide for onion crops.**)
Not. agric. Serv. Shell Agric., Cagua, 1958, No. 33, pp. 2-3, illus.

In Venezuela the best results were given by CIPC, applied after rain or irrigation at 12 l. of the commercial (47%) product in 400 l. of water per ha., 8–10 days after transplanting, and repeated 3–4 weeks later. The spray equipment should be calibrated before use.

5291. Sweet, R. D.
The status of weed control in red beets.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 168-74, bibl. 13.

A partial review is given of work on selective weed control in red beets using salt sprays, TCA, endothal, dalapon, monuron, chlorpropham, CDEC and EPTC. In field and greenhouse tests EPTC or propylethyl-n-butylthiolcarbamate pre-planting gave equal weed control. Toxicity to beets and longevity in soil of EPTC was greater than that of propylethyl-n-butylthiolcarbamate. In field experiments on sandy loam soil no correlation was observed between beet or weed response and different formulations of CDEC at 8 lb./ac. pre-planting or pre-emergence. Pre-planting treatments severely damaged beets and enhanced weed control. In greenhouse tests injury increased with temperature.—Cornell Univ.—Weed Abstr., **9**, No. 805.

5292. Feddema, L. W.
Factors regulating herbicidal effectiveness of 3-(p-chlorophenyl) 1-1 dimethylurea (monuron) on beets.
Diss. Abstr., 1960, **20**: 3460-1, being *L.C. Card No. Mic.* 60-613 of 65 pp.

In particular soil factors that affect the retention of monuron.

5293. Noll, C. J.
Chemical weeding of carrots.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 175-7.

When 10 herbicides were applied to Chantenay carrots, outstanding results were obtained with Niagara 4512 (N-(3-chloro-4-methylphenyl)-2-methylpentanamide) at 4 and 6 lb./ac. applied at the first true leaf stage, and very good results with Niagara 4556 (N-(3,4-dichlorophenyl)-methacrylamide) at 4 lb./ac. and Niagara 4562 (N-(3,4-dichlorophenyl)-2-methylpentanamide) at 4 and 6 lb./ac. applied at the same growth stage and with chlorpropham at 6 lb./ac. applied the day after sowing. EPTC, Urab, Dinoben, CDEC and propazine reduced carrot yields,—Pa St. Univ.—From *Weed Abstr.*, **9**, No. 799.

5294. Trevett, M. F., and Gardner, W.
Annual weed control in carrots.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 178-87.

The yields of topped carrots (var. Danvers) following hand-weeding or treatment with Karsil (N-(3,4-dichlorophenyl)-2-methylpentanamide) at 4 lb./ac. at the cotyledon or the first true leaf stages were greater than yields following DAC-893 (dimethyl-2,3,5,6-tetrachloroterephthalate) at 6 lb./ac. at planting, EPTC at 6 lb./ac. pre-planting, CDEC at 6 lb./ac. at planting or yields from unweeded plots. The number of carrots per 25 ft. row did not differ significantly, except for EPTC which reduced the number. Karsil gave the best control of annual broadleaved weeds, and DAC-893, CDEC and EPTC of annual grasses.—From *Weed Abstr.*, **9**, No. 800.

5295. Quaglia, A.
Prove di diserbo chimico e di tossicità in colture di carota e di sedano. (**Experiments on chemical weed control and crop injury in carrots and celery.**) [English summary ⅓p.]
Ann. Sper. agrar., 1960, **14**(1), Suppl. pp. cxxxv-cxlvi, bibl. 9, illus.

At 0·25 kg./ha. monuron was somewhat toxic to young celery plants, but neither celery nor carrots suffered more than a brief growth check when it was applied at this rate 2 months after transplanting. Grasses, bindweed and *Vinca* spp. survived, but were severely injured, and the treatment was effective for a month. Higher application rates increased the crop injury. Neburon could not be safely applied at more than 10 kg./ha. to the young crops, and at 20 kg./ha. it was slightly toxic to mature crops without giving satisfactory weed control. For reasonable weed control with a minimum of crop injury 15 l./ha. was the best rate for CIPC and 4 kg./ha. for 2,4-DES. The effects of 4 rates for each herbicide on 24 weed species are tabulated.

5296. Moran, C. H.
Progress report on weed control in processing tomatoes.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 102-6, bibl. 3.

In trials in 1959 no apparent injury to Campbell 146 tomatoes and no effects on colour indices, titratable acidity or pH of the purees were caused by Amiben at 4 lb./ac., EPTC at 4 lb./ac. or Solan (N-(3-chloro-4-methylphenyl)-2-methylpentanamide) at 4 lb./ac. applied either 1 month after transplanting (I) or at lay-by about 2 months after transplanting (II), or by chlorpropham at 8 lb./ac. at (I) and at 4, 8 and 12 lb./ac. at (II) or neburon at 3 lb./ac. at (II). Chlorpropham at 4 and 8 lb./ac. failed to control broadleaved weeds, notably ragweed (*Ambrosia artemisiifolia*). Solan failed to control emerging weeds, and neburon to control grasses. EPTC was ineffectual when not incorporated into the soil.—Campbell Soup Co., Rivertoa, N.J.—From *Weed Abstr.*, **9**, No. 801.

5297. Moore, D. H., and Dorschner, K. P.
Preliminary studies of Solan as a post-emergent herbicide for tomatoes.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 86-101, bibl. 3.

In 2 experiments Solan (N-(3-chloro-4-methylphenyl)-2-methylpentanamide) was applied to 7 varieties of tomatoes at 2, 4 and 6 lb./ac. + Thiodan + COCS in 50 gal./ac. In the first experiment, where the crop was treated at the 8–12-leaf stage, just after fruit set and at initial fruit ripening, none of the rates significantly delayed ripening or reduced total yield, though some of the treatments caused large non-significant reductions in total yield. Where the same treatments were applied to plants in heavy blossom and to plants beginning to produce ripe tomatoes, there was a significant reduction in the number and weight of early ripened tomatoes but not in seasonal yield. Treatments gave good control of *Amaranthus retroflexus*, *Chenopodium album*, *Ambrosia elatior* and various other unspecified broadleaved weeds; control of annual grasses was not satisfactory.—Niagara chem. Div., Middleport, N.Y.—*Weed Abstr.*, **9**, No. 803.

5298. Schubert, O. E., and Hardin, N.C.
Evaluation of several herbicides on tomato plants.
Proc. 14th N.E. Weed Control Conf., 1960, pp. 81-5.

In trials where herbicides were applied 3–6 weeks after planting 3 (named) varieties of hybrid tomatoes in a medium sandy loam, with irrigation supplied as needed, amiben 10 G at 4 lb./ac. [? granular] applied to the soil surface after dilution with sand gave the most promising results, with satisfactory grass and broadleaved weed control for 7 weeks and no adverse effect on tomatoes. Tomatoes also tolerated EPTC 5 G [? granular] at 5 lb./ac. diluted with sand and mixed into the soil with a rotary tiller and Solan (N-(3-chloro-4-methylphenyl)-2-methylpentanamide) at 4 lb./ac. in 200 gal./ac. EPTC gave acceptable control of barnyard grass (*Echinochloa crus-galli*), crabgrass (*Digitaria sanguinalis*), redroot pigweed (*Amaranthus retroflexus*) and lambsquarters (*Chenopodium album*) but not of purslane (*Portulaca oleracea*). Solan gave satisfactory control of broadleaved weeds but not of grasses. Simazine 4 G [? granular] applied to the soil surface and 50 WP [? 50% wettable powder] applied in 800 gal./ac., both at 2 lb./ac. were injurious to tomatoes.—W. Va Coll. Agric., Morgantown.—*Weed Abstr.*, **9**, No. 802.

Weed control in tobacco.

(*See also* 5657-5659, 5701.)

5299. Mitskovski, J.
Use of total and selective herbicides for controlling weeds in tobacco beds and their effects on the tobacco plants. [Serbo-Croatian, with English summary.]
Duvan, 1959, **9**: 288-307, illus., from *Tob. Abstr.*, 1959, **3**, Abstr. 2,102.

Among the total herbicides Weecide ($Na\,As_3\,O_2$) applied at 2 and 3 c.c./sq.m. 20 and 30 days before sowing gave the best results, decreasing weeds by 42–47% and tobacco seedlings by only 5–15% compared with control plots. Other total herbicides were also effective in weed control but at the same time decreased the number of tobacco seedlings. Among the selective herbicides Fitoksol 15 (PCP) gave effective control and had a positive influence on the number of seedlings; when applied at 6 and 8 c.c./sq.m. 20 days before sowing, 17–30% more seedlings and 64–67% fewer weeds were obtained. Calcium cyanamide was also effective in controlling weeds without seedling injury, when applied under wet conditions at 50 and 100 g./sq.m. 20 days before sowing. These rates increased seedlings by 5–10% and decreased weeds by 67–82%. Deformation of leaves and stalks was caused by direct treatment of tobacco plants with 2, 4-D and 2, 4, 5-T at 0·1–2·0%.

5300. Izard, C.
L'orobanche du tabac. (**Tobacco broomrape.**) [English summary ½ p.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 299-316, bibl. 18.

Biology, germination *in vitro*, biochemistry and control, including promising laboratory trials on seeds with rindite and DD [see *H.A.*, 29: 3502].

Weed control in tropical and sub-tropical crops.

(*See also* 6194, 6201, 6203, 6223, 6240, 6299, 6314.)

5301. Anon.
Hacia el control químico de las malezas en cacaotales. (**Advances in weed control in cacao plantations.**)
Not. agríc. Serv. Shell Agric., Cagua, 1958, No. 35, pp. 1-3, illus.

The chief weeds in Venezuelan cacao plantations are *Urera* spp., *Heliconia* spp., *Piper* spp., *Petiveria alliacea* and *Hamelia patens*. Good control has been obtained with either 6 l. of 40% 2, 4-D amine or 3 l. each of 2, 4, 5-T and 40% 2, 4-D in 400 l. of water per ha., applied to new weed growth after cutting, and repeating if necessary. These herbicides must not come in contact with the cacao trees, the banana or plantain shade plants or neighbouring vegetable crops. In young plantations 2, 4-D and related products are ruled out, because both the crop and the shade plants would be injured by them.

5302. Anon.
Herbicidas en cítricas. (**Herbicides in citrus.**)
Not. agríc. Serv. Shell Agric., Cagua, 1959, **2**: 35-6, illus.

For maintaining a circular area free from weeds under the crown of each tree, it is sufficient in Venezuela to cut the weeds, moisten the soil, and apply monuron twice a year, using 0·5–2 l. of the solution (1 kg. of the commercial product per 200 l.

of water) under each tree according to its size, and carefully avoiding the foliage.

5303. McCarty, C. D., Day, B. E., and Russell, R. C.
Effect of monuron on lemon fruit quality.
Calif. Citrogr., 1960, **45**: 174.

Plots of Eureka lemons were treated twice yearly with either 2 lb. monuron per acre or weed oil, or were cultivated to control weeds. Tests after the application of a total of 17 lb. monuron showed only very slight differences in fruit shape due to treatments and none in either rind thickness or juice content. Juice composition was not significantly changed.—Univ. Calif., Riverside.

5304. Medcalf, J. C., and de Vita, R.
The use of pre-emerge herbicides for weed control during coffee harvest.
Bull. IBEC Res. Inst. **19,** 1960, pp. 24, bibl. 16, illus.

A satisfactory degree of weed control during harvest was obtained with a single pre-emergence application of either 2, 4-D (1 kg./ha.) or simazine (½ kg./ha.). Residual effects were masked by the hand weeding and soil levelling operation normally performed after harvest in Brazilian plantations, but simazine would appear to persist longer. Doses 5–10 times greater than those recommended did no damage to the coffee trees. Although samples of coffee treated with the sprays showed no signs of taint, it is recommended that they be applied before any ripe coffee has fallen from the trees.

5305. Budowski, G.
Forestry practices of interest to coffee growers.
Coffee, Turrialba, 1959, **1**: 50-2, bibl. 5, illus.

For the destruction of surplus *Erythrina poeppigiana* shade trees 50–150 c.c. of a mixture of 15% 2, 4-D and 2,4,5-T in diesel oil, applied either in frill girdles or in bored holes, proved effective.

5306. Py, C.
La lutte contre les mauvaises herbes en plantation d'ananas. (**Weed control in pineapple plantations.**) [Summaries in Spanish, English, Portuguese and Russian, ½ to ¾ p. each.]
Fruits d'Outre Mer, 1959, **14**: 247-61, 291-9, 329-40, 369-87, 423-30, bibl. 53, illus.

In French Guinea inter-row weed control is most successfully carried out by spraying with diuron at 2·5–5 kg./ha. depending on the planting date and the vegetative stage of the crop. This herbicide is not readily leached and does not encourage the dominance of *Digitaria* spp. Other successful products (in decreasing order of effectiveness) are monuron, simazine and PCP. The grasses *Imperata cylindrica*, *Panicum repens* and *Cynodon dactylon* and nutgrass (*Cyperus rotundus*) cannot be effectively controlled unless destroyed before planting the crop. They can be eradicated either mechanically or by dalapon and ATA. Weeds in the double rows are controlled by mulching with either bituminized paper, opaque plastic sheets or straw. Mulching can also be carried out over the whole area at planting time. Herbicide application between the plants is difficult, and hand weeding tends to injure the crop.

5307. Cannon, R. C., and Prodonoff, E. T.
Trials with CMU weedicides in Queensland pineapple plantations.
Qd J. agric. Sci., 1959, **16**: 217-21.

CMU at 4 lb./acre gave more effective weed control than PCP, even when the dosage of the latter was increased to 20 lb./acre. No phytotoxic effects were detectable in pineapples sprayed with CMU at rates up to 8 lb./acre, and its toxicity to warm blooded animals is considerably less than that of PCP. Increasing the rate of application of CMU up to 6 or 8 lb./acre did not improve weed control.

5308. Rasathurai, M.
Lalang—to oil or not to oil.
Planter, Kuala Lumpur, 1960, **36**: 76-7, 87.

The following are recommended as alternatives to sodium arsenite for the eradication of lalang grass on rubber estates: (1) two sprays plus a final spot spray of a 15% emulsion of diesel oil in water, prepared using ammonium oleate, fortified with sodium trichloracetate (2%) and sodium pentachlorphenate (1%), at 100 gal./acre after slashing; (2) CMU at 80 lb./acre; (3) sodium trichloracetate (60%) at 435 lb./acre in a single application, or 3 applications at 5-week intervals of more dilute solutions; and (4) sodium chlorate applied repeatedly at 25 lb./acre, to which calcium chloride and sodium borate may be added to reduce fire risk.

5309. Stamper, E. R.
Chemical weed control: review of progress during the past ten years.
Sugar J., 1960, **22** (9): 21-2.

The latest recommendation for sugar cane plantations is a mixture of TCA, dalapon and 2, 4-D.

5310. Rochecouste, E., Vaughan, R. E., and de Reland, L. S.
Weeds of Mauritius. 1. *Bidens pilosa* Linn. 2. *Cassia occidentalis* Linn. 3. *Oxalis latifolia* H.B.K., *Oxalis debilis* Kunth., *Oxalis repens* Thunb.
Leafls Mauritius Sugar Ind. Res. Inst. **1, 2** and **3,** 1959, pp. 4, 4 and 7, illus., bibl.

The weeds are described and illustrated, vernacular names are given, ecology and distribution briefly discussed, diseases and insect pests mentioned and control measures outlined. *B. pilosa* is said to be well controlled in cane fields by pre-emergence applications of monuron or diuron at 1·6–3·2 lb./ac. This treatment is also said to be effective on *Oxalis* spp.; however, ploughing followed by MCPA or 2, 4-D (preferably esters) at 3-4 lb./ac. is recommended.—*Weed Abstr.*, **9**, No. 848.

5311. CHAPMAN, L. S.
Weedicide damage in ratoon Trojan.
Cane Grs' quart. Bull., 1960, **23**: 132-3, illus.

Caused by 5 lb./acre dalapon plus 7 lb./acre TCA applied 2½ weeks after 10 lb./acre dalapon.

5312. TIPPANNAVAR, M. B., HIREGOUDAR, S. V., AND ARAKERI, H. R.
Eradication of nut-grass.
Mysore agric. J., 1959, **34**:122-6, bibl. 6.

Almost 90% control of *Cyperus rotundus* was obtained in sugar cane land by tillage followed by 2 sprays of 1½ lb. 2, 4-D in 60 gal.—Sugarcane Res. Stat., Mandya.

5313. ANON.
El herbicida eptam resulta eficaz contra el corocillo. **(The herbicide eptam is effective against nutgrass.)**
Not. agric. Serv. Shell Agric., Cagua, 1959, **2**: 41-2, illus.

The promise previously shown by eptam (72% EPTC) against nutgrass has been confirmed. The best results were obtained by harrowing and ploughing, then incorporating eptam at 20 kg./ha. No danger to crop germination has yet been reported, but confirmation of this is awaited.

5314. CHRISTIE, G. A.
Nut grass.
Cane Grs' quart. Bull., 1960, **23**: 116-17.

Cyperus rotundus was eliminated by fumigation with methyl bromide at 1½ lb. per 100 sq. ft., also by heavy dressings of 2, 4-D.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 4652, 4668, 4670, 4681, 4686, 4692, 4693, 4701, 4734-4737, 4740-4742, 4745, 4746, 4750, 4751, 4766, 4799, 4810, 4814, 4816, 4817, 5221, 5233, 5234, 5236, 5279-5298, 6280, 6293, 6295, 6296, 6312, 6320, 6324, 6331.)

5315. GRADY, J. C., JR.
The vegetable industry of Missouri.
Diss. Abstr., 1960, **20**: 2459-60, being *L.C. Card No. Mic.* 59-5639 of 146 pp.

Problems of, and suggestions for reviving, a declining industry.

5316. SINGH, H. B., THAKUR, M. R., AND BHAGCHANDANI, P. M.
Vegetable seed production in Kulu Valley—I. and II.
Indian J. Hort., 1959, **16**: 92-101, illus., and 153-61, illus.

After describing the climate of the area, details are given of the methods used for producing seed from tomatoes, eggplants, capsicums, cucurbits, okra, pulses, brassicas and some root crops.

5317. MACZÁK, J.
Korai zöldségtermesztésünk gazdaságossági kérdései. **(Economic problems of early vegetable production.)** [Russian and German summaries 2½ pp. each.]
Kisérl. Közl., Sect. C, 1958 (issued 1959), **51C**(3): 107-35, bibl. 14.

In Hungary, for both home consumption and export.

5318. GUMPENSTEIN (KARNER, L.)
Ergebnisse der Sonderkulturen-Versuche des Jahres 1959. **(Results of variety trials with vegetables and other crops at Gumpenstein in the year 1959.)**
Versuchsergebn. Bundesversuchsanst. alpenländ. Landw. Gumpenstein **50**, 1959, pp. 103, illus.

Varieties of the following crops were tested under alpine conditions: Cabbages, savoys, red cabbages, cauliflowers, kohl rabi, lettuces, spinach, carrots, beetroot, radishes, parsley, celeriac, peas, dwarf and runner beans, paprika, tomatoes, cucumbers, oil poppies, mixed cultures of vegetables, berry fruits and medicinal plants.

5319. AHMADI, A. A.
Vegetable variety trials at American University farm.
Publ. Amer. Univ. Beirut **9**, 1959, pp. 25, illus.

Trials of 137 varieties of various vegetables were carried out in the Bekaa region, on a clay soil of pH 8·02 fertilized with complete fertilizer at 100 kg./per dunum (1,000 sq. m.). Varieties of green beans, cabbage, cucumber, eggplant, lettuce, musk melon, okra, pea, sweet pepper, hot pepper, radish, summer squash, sweet corn, tomato and watermelon that gave good results are listed.

5320. ODLAND, M. L., NOLL, C. J., AND LYTLE, I. R.
1959 vegetable variety trials.
Progr. Rep. Pa agric. Exp. Stat. **213**, 1960, pp. 8, illus.

Full, tabulated performance data for numerous strains of bush bean, cabbage, sweet corn, eggplant, tomato and capsicum.

5321. BAUMANN, E.
Weitere Versuche zur Gemüsejungpflanzenanzucht in Torfkultursubstraten. **(Further experiments on raising vegetable seedlings in peat media.)**
Dtsch. Gartenb, 1960, **7**: 13-15, bibl. 8.

Peat media, to which individual nutrients or a complete fertilizer had been added, proved superior to compost soil for raising seedlings of several types of vegetables. The addition of molybdenum to peat was beneficial, especially for cauliflowers and lettuce. In compost soil Mo did not have a beneficial effect.—Inst. Gemüseb. Humboldt-Univ. Berlin, Grossbeeren.

5322. Vik, J.
Gransking av frøspiringa ved ulike såtider i erter, bønner og piklesagurk 1954-1956. **(Experiments on the germination of peas, beans and cucumbers as affected by the date of sowing, 1954-56.)** [English summary 1¼ pp.]
Forskn. Landbruk., 1960, **11**: 9-27, bibl. 20.

In 3 years' trials at the Norwegian Experiment Station, Landvik, Grimstad (58° 26′N), the average emergence of all varieties of peas, beans and cucumbers sown from April 18 onwards was 76, 75 and 52%, respectively, which showed reductions of 21, 23 and 43%, respectively, compared with laboratory tests. This suggested that there should be more efficient laboratory seed control tests, which would exclude seeds not capable of proper germination under unfavourable weather conditions. The time needed for germination varied from 24 down to 8 days for peas, 36 to 9 days for beans and 39 to 9 days for cucumbers. In peas the earlier always germinated before the later sowings, but the first 3 or 4 sowings of beans and cucumbers germinated about the same time, which indicates that the first 3–4 weeks in the ground can only be considered as a storage period for these two crops. The recommendation is therefore made that peas should be sown as early as possible, but that beans and cucumbers should be sown between May 10 and May 20.

5323. Salokangas, K.
Muovin käytöstä avomaan varhaisvihannesviljelyssä. **(The use of plastic covers in outdoor vegetable growing.)** [English summary 17 lines.]
Reprint from *Maatalous ja Koetoiminta*, 1959, **13**: 262-8, illus.

Cucumbers, carrots and cauliflowers grown in plastic frames produced much higher yields than comparable plants grown in the open.—Agric. Res. Centre, Piikkiö, Finland.

5324. van der Post, C. J.
De warmtehuishouding van de grond in de groenteteelt onder glas. **(Soil temperature relationships in vegetable growing under glass.)**
Landbouwk. Tijdschr., 1960, **72**: 73-9, bibl. 7, illus.

A discussion of the effects on soil temperature of soil type, glass covering and artificial soil warming, and of the heat requirements of lettuces, tomatoes and cucumbers, with reference to conditions in the South-Holland glasshouse district.

5325. Buntrock, H.
Untersuchungen über den Einfluss zusätzlicher Bestrahlung auf das Wachstum von Gurken-, Tomaten- und Salatpflanzen. **(Studies on the effect of supplementary illumination on the growth of cucumber, tomato and lettuce plants.)** [Russian and English summaries 14 and 12 lines.]
Arch. Gartenb., 1960, **8**: 3-49, bibl. 71, illus.

The following sources of light were compared for the supplementary illumination of cucumbers, tomatoes and lettuces during the winter months: a mercury-vapour high-pressure lamp with and without a fluorescent cover, a mixed light lamp, an incandescent lamp and infra-red light and dark radiators. The best results were obtained with the mercury-vapour high-pressure lamp with a fluorescent cover, which reduced stem elongation but promoted other growth reactions. Infra-red light radiators and incandescent lamps caused much bolting in lettuce. Supplementary illumination with infra-red light radiators from 7 a.m. to 7 p.m. proved superior to illumination during the period 7 p.m. to 7 a.m. Despite supplementary illumination with infra-red light radiators, cucumbers and tomatoes only reached the transplanting stage at temperatures of 18–20° C.; they failed to do so at 8–10° C. Lettuce plants became etiolated at the higher temperature range.—Inst. f. Gemüseb., tech. Hochsch. Hannover.

5326. Seidel, E.
Die Wirkung der Zusatzbelichtung auf Wachstum und Ertrag einiger Gemüsearten. **(The effect of supplementary light on the growth and yield of several vegetables.)** [Russian and English summaries 21 and 16 lines.]
Arch. Gartenb., 1960, **8**: 177-245, bibl. 75, illus.

Low-voltage fluorescent tubes with an energy emission in the visible range were found to be the most suitable source of supplementary illumination for seedlings of several vegetables. An aggregate of 10 such tubes of the type HNI 202 installed 5 cm. above the plants produced the most favourable light intensity ($E = 2\cdot7 \times 10^{-2}$ cal × cm.$^{-2}$ × min.$^{-1}$). Artificial light proved most profitable if applied for an 8-hour period either between 4 p.m. and midnight or between midnight and 8 a.m., especially between the middle of November and the middle of December, from sowing up to the time of transplanting. The vegetables studied were cucumber, tomato, lettuce, cauliflower and kohl-rabi.—Inst. Gemüseb. Grossbeeren, Humboldt-Univ., Berlin.

5327. Borna, Z.
Wpływ następczy międzyplonowych ozimych oraz przedplonowych nawozów zielonych na plony warzyw. **(The influence of winter crops and green manure crops on the yields of subsequent vegetable crops.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 27-32, bibl. 18.
Die Gründüngungspflanzen als Zwischenfrucht im Gemüsebau. **(Green manure plants in a rotation of vegetable crops.)**
Dtsch. Gartenb., 1960, **7**: 96-8, bibl. 14, illus.

Winter and early spring green manure crops planted before vegetables reduced the yields of several types in years with low summer rainfall. Considerable increases in yield were obtained, however, in the second year after ploughing in green manure crops.

5328. Buczak, E.
Uprawa ogórków, cebuli i porów na zielonych nawozach w świetle trzyletnich doświadczeń. **(Growing cucumbers, onions and leeks after green manures.)** [English and Russian summaries 1 p. each.]
Biul. Warzyw., 1959, **4**: 33-45, bibl. 10.

The experiments described were carried out on a medium clay soil with a low humus content (1·45%) and poor structure. Cucumbers grown after green manure mixtures, ploughed in the previous autumn, in some cases gave yields as high as those obtained from 30 tons/ha. of farmyard manure ploughed in at the same time. Mixtures tried and found suitable for cucumbers were: (1) spring vetch, peas, small field beans and oats, (2) lupins and oats, and (3) buckwheat, phacelia, mustard and spring rape. However, reduced yields of cucumbers were obtained in dry years following a winter green manure mixture ploughed in in the spring. Onion yields were good after a spring mixture had been ploughed in in the autumn. Leeks did well in wet years after a winter mixture ploughed in in the spring.

5329. Cholewińska, B.
Nawożenie roślin warzywnych w płodozmianie. **(Fertilizing vegetables in the crop rotation.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 47-56, bibl. 5.

The effects of organic manures and green manure crops on rotations, that included cabbages, tomatoes and red beets, are described. Compost gave increases in yield similar to farmyard manure, but its effect lasted for a shorter period. Green manures ploughed under in the autumn increased yields considerably, but again they were effective for a shorter time than farmyard manure. Green manures ploughed under in the spring dried the soil and should be used only in regions of high rainfall. Mineral fertilizers increased the effectiveness of compost and green manures, particularly in the 2 or 3 years following the addition of the organic fertilizers.

5330. Hellwig, A.
Mieszanki wieloletnich motylkowych z trawami w płodozmianie warzywnym. **(Perennial legume and grass mixtures in a vegetable crop rotation.)** [English and Russian summaries 1 p. each.]
Biul. Warzyw., 1959, **4**: 57-70, bibl. 10.

Clover with timothy and alfalfa increased yields of cucumbers in the first year after ploughing in the mixture and also increased onion yields in the following year. The addition of a small amount of farmyard manure to the mixture increased its beneficial effects, especially in years with unfavourable growing conditions. Heavy applications of mineral fertilizers were as effective for cabbages and tomatoes as organic fertilizers.

5331. Bernstein, L.
Salt tolerance of vegetable crops in the west.
Agric. Inf. Bull. U.S. Dep. Agric. **205**, 1959, pp. 5, bibl. 1. illus.

Salinity affects the growth of vegetables primarily by decreasing the availability of water, but it may also involve nutritional effects. It generally lowers yields and quality but some favourable responses occur, e.g. increased sugar contents, especially in carrots. Garden beet, kale, asparagus and spinach are tolerant of salinity and show only small yield losses at 5–8 millimhos. Tomato, cabbage, potato and carrot are among moderately tolerant crops which show yield losses at 3–5 mhos. Radish, celery and beans are sensitive, and their yields decline at 2–3 mhos. The salt hazard can be minimized by providing adequate drainage, selecting tolerant crops, irrigating adequately and by using sloping, double-row raised beds with the seeds sown on either side of the ridge.

5332. Bielka, R.
Ertragssteigerung im Feldgemüsebau durch Bodenbedeckung. **(Yield increases by soil covering in the field production of vegetables.)**
Dtsch. Gartenb., 1960, **7**: 98-100, bibl. 4.

Covering the soil gradually with organic materials, preferably stable manure, and working them into the soil in the course of cultivation, increased the yields of 18 vegetables by an average of 27%. The N from the manure was largely lost when the latter was spread in a thin layer, and there was no effect of mulching on weed growth, but the practice was profitable, provided spreading of the manure was done mechanically.—Inst. f. Sonderkult., Abt. Obst-u. Gemüseb., Karl-Marx-Univ., Leipzig.

5333. Jones, L. T.
Commercial vegetable growing in the Perth metropolitan region.
J. Agric. W. Aust., 1960, **1**: 373-81, bibl. 5, illus.

Fertility problems on irrigated sands and peaty swamps.

5334. Groven, I.
Gødningsforsøg med køkkenurter. (**Manurial experiments with vegetables.**) [English summary $2\frac{3}{4}$ pp.]
Tidsskr. Planteavl, 1959, **63**: 553-612.

Manurial experiments were conducted with vegetables during the period from 1922 to 1955 at the Blangstedgaard Experiment Station, Odense (clay loam), and at the Hornum Experiment Station, Jutland (sandy loam). The present report summarizes data for the period 1934 to 1955. *Brussels sprouts:* These showed a better response to inorganic fertilizer than to farmyard manure on both the light and heavy soils. Quantity and quality of the crop increased with increasing rates of F.Y.M. and fertilizer. Omission of N decreased both yield and quality. *Cauliflowers:* These showed responses similar to those of brussels sprouts. Inorganic fertilizer alone was able to supply the nutrient needs of the plants, but a combination of F.Y.M. and fertilizer was equally suitable when used at adequate rates. *Cabbages and red cabbages:* Both summer and winter cabbages have shown increasing yields with increasing rates of fertilizer. Both F.Y.M. and inorganic fertilizer supplied the nutrients needed, but a combination of both types of manure was especially valuable. *Lettuce:* The nutrient demands of lettuce are apparently not so large as for some other vegetables. On the heavy soils lettuce responded better to F.Y.M. than to inorganic fertilizer. On the light soils a combination of manure and fertilizer was desirable. *Celery:* Celery responded with increased yields to the higher rates of both F.Y.M. and fertilizer. Either material was satisfactory, so long as the rates of application were adequate. *Celeriac:* This crop responded favourably to both F.Y.M. and inorganic fertilizer. The largest yields and best quality were obtained with the heaviest rates of application. *Tomatoes:* The largest yield was obtained with the heaviest application of F.Y.M. This treatment, however, resulted in a considerable number of discoloured fruits, and the best quality was obtained with lower rates of fertilization. *Cucumbers:* Large increases in yield and quality occurred with increasing rates of fertilization. F.Y.M. gave the best results, but a combination of manure and inorganic fertilizer was satisfactory. Cucumbers were especially sensitive to the omission of K. *Garden beet:* Beet showed marked responses in yield and quality to increasing rates of fertilizer, especially on the lighter soils. Inorganic fertilizer was utilized a little better than F.Y.M., but a combination of the two also seemed suitable for this vegetable. *Carrots:* These also responded with increased yields to increasing quantities of fertilizer application, especially on light soil. The yield responses on the heavier soil were very small, and on these soils quality was reduced by heavy applications of N. *Scorzonera:* Scorzonera responded to fertilizer applications but did best with the smaller rates. The omission of K resulted in a marked decrease in yield. *Parsnips:* On the light soil parsnips gave increased yields with increasing rates of manuring up to 14·4 tons of F.Y.M. per acre. On the heavy soil only small increases in yield were noted. F.Y.M. was superior to inorganic fertilizer in both localities. *Chervil:* Chervil showed yield responses to increasing rates of F.Y.M. on both soil types. On the heavy soil inorganic fertilizer gave a response equal to that obtained with F.Y.M., whereas on the light soil F.Y.M. was better. A combination of the two kinds of manure was suitable on both soils. *Horseradish:* This showed only small increases in yield for increasing rates of fertilization. F.Y.M. was slightly better than inorganic fertilizer. A combination of F.Y.M. and fertilizer seemed satisfactory. N was the nutrient element to which horseradish responded best. *Spinach:* Spinach responded with increased yields to increasing rates of fertilization. In both localities inorganic fertilizer gave a better response than F.Y.M., but a combination of the two kinds of manure was satisfactory. N was the individual element to which spinach responded best. *Shallots:* These responded with increased yields to increasing rates of fertilizer application on both soil types. F.Y.M. was superior on both the light and heavy soils, but a combination again seemed satisfactory. Fertilizer treatments which resulted in the largest yield of shallots also resulted in the best quality. *Rhubarb:* Manuring resulted in increased yields with increasing rates of fertilization. Inorganic fertilizer was best on the light soil, and F.Y.M. on the heavy soil. Regardless of method of manuring yields were considerably greater on the heavier soil type. A treatment combining both kinds of manure seemed adequate. N was the element to which rhubarb showed the greatest response. *Beans:* These responded with increased yields to increasing rates of fertilizer application. A combination of both F.Y.M. and inorganic fertilizer seemed desirable. N was the element to which beans responded most. *Peas:* Yellow peas responded with increased yields to a combination of F.Y.M. and inorganic fertilizer. The response in yield to increasing rates of fertilizer application was not large. Marrowfat peas, however, showed a considerable response in yield to increasing rates of fertilization. Here a combination treatment of F.Y.M. and inorganic fertilizer proved desirable. The omission of any of the major nutrient elements markedly reduced yields. *Seed production* (*chervil, bean, spinach, radish, cabbage and carrot*)*:* On the light soil the largest seed crops were obtained with the higher rates of fertilizer. On the heavy soil the seed crop was often better with lower rates of fertilization. N and K were both important for the production of a high yield of high quality seed. [From author's summary.]

5335. Antipenko, N., and Almazov, B.
Methods of fertilizer application and its effects on the yields of tomatoes and cabbages grown in valley bottoms. [Russian.]
Sel'. Hoz. Sibiri, 1959, No. 2, pp. 47-9.

Cabbages and tomatoes produced markedly ncreased yields when humus plus NPK at 90: 120: 120 was broadcast before ploughing and further umus plus NPK at 15: 15: 15 was placed in the urrows before planting. Separate application of he same quantities of humus and mineral fertilizers roduced much smaller increases in yield.

5336. Hortenstine, C. C.
Boron-aluminum relationships in the soil and in plant uptake.
Diss. Abstr., 1960, **20**: 2471-2, being *L.C. Card No. Mic.* 59-6100 of 117 pp.

Rutabaga [swede], lettuce and other plants were ertilized with aluminium sulphate at 0, 20 and 0 lb. of A1 per acre in combination with boric acid t 0, 1 and 2 lb. of B per acre. B deficiency sympoms developed in some of the rutabagas and ettuce. The addition of B resulted in an increased ptake of B and higher yields. The addition of A1 reduced lettuce yields.—Univ. Fla.

5337. Hori, Y., and Others.
Calcium nutrition of vegetable crops. I. Calcium deficiency symptoms of cabbage, onion and spinach. [Japanese, with English summary, 2 pp.]
Bull. Tôkai-Kinki agric. Exp. Stat., hort. Stat., 1959, No. 5, pp. 98-114, bibl. 24, illus.

The symptoms of Ca deficiency are described for ach of the 3 crops. Decreasing the Ca supply ncreased the total N and K contents, had no effect n the P and Mg contents, but decreased the total arbohydrates and reducing and non-reducing ugars. The water-soluble, acetic acid-soluble and cetic acid-insoluble Ca contents of the leaves and ulb scales of the 3 plants are discussed. A marinal rot of the leaves of cabbage and Chinese abbage, prior to heading, was shown to be due to a deficiency, but it could not be definitely estabshed that a heart rot occurring after heading was ue to Ca deficiency.

338. Geissler, T.
Die Höhe des Magnesiumentzugs bei unseren Gemüsearten. (**The amount of magnesium withdrawn from the soil by our vegetables.**)
Dtsch. Gartenb., 1960, **7**: 44-5.

igures for the withdrawal of K_2O, CaO and MgO y 18 vegetables, based on 4 years of field experiients carried out in a slightly acid (pH 6·4), sandy am.

5339. Sorteberg, A., and Vigerust, E.
Markforsøk med molybden. (**Field experiments with molybdenum.**) [English summary 1½ pp.]
Forskn. Landbruk., 1960, **11**: 31-56, bibl. 16.

At the Experiment Station of Moldstad på Smøla carrots on peat soil exhibited symptoms of Mo deficiency, and they responded to applications of Mo, especially in conjunction with lime, with a considerable increase in yield. In preliminary trials the following, among other, crops grown under the same conditions also showed Mo deficiency symptoms and a marked increase in yield following the application of Mo: lettuce, cauliflower, swede, turnip, kale, beetroot, parsnip and parsley. In most cases liming prevented the appearance of Mo deficiency symptoms. Whether N was supplied as ammonium or nitrate did not affect the Mo requirement.

5340. Notley, L. F., and Wilson, G. L.
Nitrate accumulation in relation to molybdenum deficiency leaf scorch symptoms.
Aust. J. biol. Sci., 1960, **13**: 104-6, bibl. 7.

Analyses of injured and uninjured portions of Mo-deficient lettuce and tomato leaves showed a regular association between injury and high NO_3 level (2·3–3·0% fresh weight). The pattern of NO_3 distribution in leaves indicates the inadequacy of whole leaf determinations in seeking relationships between NO_3 contents and the appearance of foliar symptoms.

5341. Duckworth, R. B., and Hawthorn, J.
Uptake and distribution of strontium in vegetables and cereals.
J. Sci. Food. Agric, 1960, **11**: 218-25, bibl. 22, illus.

Carrots, turnips, beetroot, cauliflowers and brussels sprouts were grown in sand, using culture solutions containing strontium chloride labelled with Sr^{89}. Analysis of the mature plants has shown that in carrots, beetroot, cauliflowers and brussels sprouts the highest proportion of Sr accumulated in the leaves, whereas in turnips the highest percentage was found in the roots. In all cases the root showed a concentration of Sr in the peripheral zone. The flower of the cauliflower, the sprouts of the brussels sprouts, and the edible parts of carrots and beetroot contained relatively smaller percentages of Sr.

5342. Geissler, T., and Göhler, F.
Fünfjährige vergleichende Versuche zum erdelosen Anbau von Gemüse unter Glas nach dem Tank- und Mineralkulturverfahren. (**Comparative experiments lasting five years on soilless culture of vegetables under glass in water and gravel culture systems.**) [Russian and English summaries 8 lines each.]
Arch. Gartenb., 1959, **7**: 416-23, bibl. 6, illus.

In comparing gravel culture with ordinary soil culture the following percentage increases in yield and monetary returns were obtained: cucumbers 31 and 35, early tomatoes 80 and 115, late tomatoes 45 and 12, early kohl-rabi 8 and 3. There was little or no advantage in this method for growing lettuces, but returns increased by 11% for radishes and by 6% for red peppers (capsicums). Both gravel culture and water culture were distinctly disadvantageous for melons. Water culture was generally inferior to both soil and gravel culture, but was intermediate for early and late tomatoes and superior for early kohl-rabi. It gave very poor results with radishes.

5343. Göhler, F.
Nährstoffverbrauch und -verwertung bei der erdelosen Kultur von Gurke und Tomate unter Glas. (**The removal of nutrients and their utilization in the soilless culture of cucumbers and tomatoes under glass.**) [Russian and English summaries 15 and 13 lines.]
Arch. Gartenb., 1960, **8**: 146-60, bibl. 13.

Plants of an early cucumber variety growing in soilless culture removed more phosphate than comparable cucumbers grown in soil. The utilization of the NPK nutrients supplied in soilless culture amounted to a little over 20%. In an early tomato variety the largest quantity of nutrients were removed from the solution when the concentration was 0·2%. With an increase in the concentration of the nutrient solution the plant content of crude ash, N and K rose, while that of Ca fell. With P and Mg the relationship was less clear. In soilless culture less N and K was taken up per plant, but more P, than has been reported by other workers for ordinary soil culture. At a solution concentration of 0·2%, as normally used in these experiments, cucumbers made distinctly better use of the nutrients than tomatoes.—Inst. Gemüseb. Grossbeeren, Humboldt Univ., Berlin.

5344. Joubert, T. G. la G.
Role of cross and self-pollination in vegetable varieties.
Fmg S. Afr., 1960, **36**(1): 18-19.

The extent of self- and cross-pollination shown for numerous vegetables.

5345. Eisenštat, J. S.
The role of additional alien pollination during hybridization. [Russian, with English summary 8 lines.]
Ž. Obšč. Biol., 1959, **20**(2): 115-27, bibl. 25.

In the course of intervarietal hybridization investigations a mixture of pollen of vetches, beans, lucerne and lupins was applied to peas and a mixture of potato, tobacco and nightshade pollen to tomatoes. The addition of alien pollen had a favourable effect on fertilization when either the quantity or the quality of the pollen of peas or tomatoes, as the case may be, was unsatisfactory. However, when the pea or tomato pollen was in sufficient quantity and of high germination capacity, the alien pollen had no appreciable effect or even had an adverse effect.

5346. Janes, R. L., Potter, H. S., and Guyer, G. E.
Insect and disease control on commercial vegetables and truck crops.
Ext. Bull. Mich. St. Univ. **312**, revised 1960, pp. 91.

Detailed tabulated advice on chemical control measures.

5347. Anon.
Recomendaciones para los cultivos de verano. (**Recommendations for [protection of] summer crops.**)
Inf. Serv. Shell Agric., Cagua, Ser. A, **13**, 1959, pp. 66, illus.

Disease and pest control on vegetables and other crops in Venezuela.

5348. N.S.W. Department of Agriculture, Biological Branch.
Disease control in vegetable growing.
Agric. Gaz. N.S.W., 1960, **71**: 26-31, illus.

Preventive measures described, including a table of recommended seed treatments.

5349. Ministry of Agriculture, London.
Stem and bulb eelworm on vegetables.
Adv. Leafl. Minist. Agric. Lond. **440**, revised 1959, pp. 6, illus.

Damage by, life history and control of, *Ditylenchus dipsaci.*

5350. N.S.W. Department of Agriculture, Entomological Branch.
Insect control—vegetable weevil, *Listroderes obliquus.*
Agric. Gaz. N.S.W., 1960, **71**: 129, illus.

Recommendations for pre-planting cultivation and suitable baits.

5351. N.S.W. Department of Agriculture, Entomological Branch.
Control of the green vegetable bug, *Nezara viridula.*
Agric. Gaz. N.S.W., 1960, **71**: 73 + coloured plate.

5352. Hammond, G. H.
Control of white grubs (*Phyllophaga* spp.] in eastern Canada.
Publ. Canada Dep. Agric. **1069**, 1960, pp. 8, illus.

On crops, including vegetables, strawberries and turf.

5353. Howitt, A. J.
Control of the garden symphylid in the Pacific Northwest.
Down to Earth, 1960, **15**(4): 6-10, 24, illus.

Telone was found to be the most effective fumigant for controlling *Scutigerella immaculata* in vegetable crops [see also *H.A.*, 30: 2125]. Unless a heavy dose is required for nematode infestation, smaller doses repeated annually are preferable.—Wash. St. Univ.

5354. MacPhee, A. W., Chisholm, D., and MacEachern, C. R.
The persistence of certain pesticides in the soil and their effect on crop yields.
Canad. J. Soil Sci., 1960, **40**: 59-62, bibl. 9.

Investigations of certain pesticides applied annually to the soil from 1949 to 1953 showed a descending order of persistence as follows: arsenic, DDT, BHC and chlordane. Arsenic, DDT and sulphur caused decreases in the yields of some vegetable crops. DDT, BHC and parathion were translocated to root crops and arsenic was accumulated in plants. Lime corrected the effects of sulphur applications.—Canada Dep. Agric., Kentville, N.S.

5355. Cook, J. A.
Precooling fruits and vegetables for marketing.
Ext. Folder Mich. St. Univ. **F-285,** 1960, pp. 7.

Methods of precooling described include hydro-cooling, contact icing, vacuum cooling and air cooling.

5356. Parsons, C. S.
Extending the storage life of cabbage, celery, lettuce and tomatoes aboard a navy supply ship.
Mktg Res. Rep. U.S. Dep. Agric. **336,** 1959, pp. 15, illus.

After 6 weeks' storage at 36° F. 79% of the celery stored in polythene-lined crates remained edible, whereas only 71% remained edible in unlined crates. Of the trimmed lettuce stored in lined crates at 35° F. 81% remained edible after 6 weeks, while only 61% of that stored untrimmed and in unlined crates was edible. At the end of 4 weeks' storage at 36° F. 79% of the cabbage in lined crates was still edible, compared with 70% in unlined crates. The original colour and crispness of cabbage were retained longer in lined than in unlined crates at both 36° and 38° F. [see also *H.A.*, 30: 3742]. When mature-green tomatoes were ripened for 3 weeks at 58° F. and then stored for 2 weeks at 35° F., nearly 90% remained edible. But when firm-ripe tomatoes were stored continuously at 35° F. for about the same time (34 days) only 10% were edible. Mature-green tomatoes stored at 35° F. did not ripen at all. Celery stored in unlined crates at 36° F. and at a relative humidity of about 85% wilted badly during a 6-week test period. Celery stored in lined crates, on the other hand, remained crisp and firm throughout the test. Lettuce stored in the regular ship's cargo crates at 35° F. was slightly to moderately wilted at all inspections. Weight losses in lettuce stored in lined crates never exceeded 1% and the heads remained crisp during the entire test. Trimmed lettuce stored in unlined crates wilted more severely than lettuce stored by any other method. [From author's summary.]

5357. Henriksen, A.
Forsøg med opbevaring af gulerødder, kål og kepaløg, sprøjtet med maleinhydrazid. 1954-57. **(The storage of carrots, cabbages and onions after spraying with maleic hydrazide. 1954-1957.)**
Tidsskr. Planteavl, 1959, **63**: 689-95.

Spraying carrots with 0·12% of Antergon 20 (20% MH) in 1,000 l. of water per ha. 1–2 weeks before harvest increased their keeping quality both for short and long periods of storage. The growth of the tops was inhibited, but the roots lost nothing of their fresh appearance. Cabbages did not respond to the treatment, and the results obtained with onions were uncertain, though positive.

5358. Samy, T. S. A., Kamat, V. N., and Pandya, H. G.
Oxalate contents of leafy vegetables.
Curr. Sci., 1960, **29**: 133, bibl. 6.

Ranging from 0·366% in lettuce to 1·944% in *Amaranthus gangeticus.*

5359. Bremer, A. H., and Apeland, J.
Vitamin C i turka og friske bladgrønsaker gjennom året. **(The vitamin C content of dehydrated and fresh leafy vegetables throughout the year.** [English summary 1 p.]
Meld. Norg. LandbrHøgsk, 1959, **38**(14): 1-13, bibl. 10, illus.

Investigations at the Department of Vegetable Crops, Agricultural College of Norway, are discussed. Normal methods of drying leafy vegetables to a 4% moisture content allowed the retention of most of the vitamin C, e.g. 75% in curled parsley and kale, and even better quality was got by removal of oxygen and storing at a low temperature. Ordinary and waxed paper proved unsuitable for packaging in store, plastic bags and tight tin cans being better. Investigations showed that beets will produce more than 5,000 mg., root parsley 4,500 mg., curled parsley 2,750 mg., welsh onions 2,200 mg. and chives 1,800 mg. of vitamin C per square metre.

Artichokes.

5360. Duranton, H.
Évolution de l'arginine dans le tubercule de topinambour au cours du cycle végétatif. **(The evolution of arginine in Jerusalem artichoke tubers during the growing cycle.)**
Ann. Physiol. vég., 1959, **1**: 231-42, bibl. 24.

The growing cycle of this short-day plant can be divided into 3 phases in relation to arginine content: (1) anabolism in spring with a rapid fall in May; (2) katabolism in summer with a rapid rise in September; (3) a high content during winter dormancy. Evidence is presented which suggests that the rapid increase in September is due to reduction in either photoperiod or light intensity and that the disappearance of arginine from the tuber in May is associated with indole acetic acid, the content of which rises rapidly at this time.—Stat. cent. Physiol. vég., Versailles.

5361. DURANTON, H.
Étude du métabolisme de l'arginine libre dans les tissus du topinambour cultivés *in vitro*. **(A study of the metabolism of free arginine in the tissues of the Jerusalem artichoke cultivated *in vitro*.)**
C.R. Acad. Agric. Fr., 1960, **46**: 122-4.

Chromatographic study of rhizome parenchyma.

Asparagus.

(*See also* 4718, 4883, 6308.)

5362. HUYSKES, J. A.
Teelt en verwerking van groene en witte asperges. **(The culture and processing of green and white asparagus.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1960, **23**: 165-71, bibl. 20, illus.

Three trials were carried out with a view to determining the possibilities and advantages of growing green asparagus for the Dutch market instead of the usual blanched product. The green asparagus was grown without ridging. The main advantages were that production need not be limited to sandy soils and that the harvesting operation is much simpler and more rapid. The yields however, were lower, owing mainly to damage from frost or low temperatures at night and from asparagus fly. Green asparagus must be harvested at the correct length and processed as rapidly as possible. A market would have to be created for the green product in Holland.—I.V.T., Wageningen.

5363. GARTHWAITE, J. M.
Asparagus spacing trial: progress report.
Exp. Hort., 1960, No. 3, pp. 21-3.

Yields are tabulated of trial beds planted 3 ft., 4 ft. 6 in., and 6 ft. between the rows with the plants spaced 1 ft. or 2 ft. apart in the rows. At 2 ft. within-row spacing the total yield increased as the inter-row spacing was decreased. Spacing plants at 1 ft. apart in the rows gave higher yields than spacing at 2 ft. at all inter-row spacings. When production of the 3 best grades was compared, the results were very similar to those of total yield. The maximum yield was reached at 1 ft. × 4 ft. 6 in., and there was no further increase at 3 ft., thus indicating that at spacing closer than 4 ft. 6 in. between rows the proportion of low quality sticks increased. At all spacings male plants gave poorer yields than plants in unsexed beds, although male beds gave a higher percentage of top quality sticks.—Luddington exp. Hort. Stat.

5364. SHEWFELT, A. L., AND MOHR, W. P.
Effect of spear length, spear portion and harvest date on the composition and quality of asparagus.
Canad. J. Plant Sci., 1960, **40**: 371-4, bibl. 5.

Variations in moisture, soluble solids, ascorbic acid and fibre contents were observed, together with variations in the colour, texture and flavour of the frozen and cooked products. Highly significant differences in all measurements occurred between the tip, centre and butt of the spear regardless of harvested spear length. The length of harvested spear gave differences in the moisture, soluble solids and fibre content but not in the ascorbic acid level. Colour and texture ratings of the frozen and cooked product varied according to spear length, while no difference occurred in flavour rating. The moisture, soluble solids, and ascorbic acid content were influenced by harvest date, and there was an indication that these were associated with variations in the weather prevailing at the time of harvest. [From authors' abstract. See also *H.A.*, 30: 2141.]—Dep. Agric., Morden, Manitoba.

Brassicas.

(*See also* 4740, 5335, 5337, 5356, 5357, 5591, 5628, 6310, 6317, 6319, 6329.)

5365. FULLER, D. J.
Winter cauliflower in Brittany.
Agriculture, Lond., 1960, **67**: 31-5.

Methods of production and marketing described.

5366. SALOKANGAS, K.
Talvikaalilajikkeista. **(Winter cabbage variety trials.)** [English summary 12 lines.]
Reprint from *Maatalous ja Koetoiminta*, 1959, **13**: 257-61.

Thirteen varieties compared with Amager Halvhög with respect to growing period, yield, storage quality and head characteristics.

5367. ANON.
Ensayo de variedades de repollo en los valles de Aragua. **(Cabbage variety trials in the valleys of Aragua [Venezuela].)**
Not. agric. Serv. Shell Agric., Cagua, 1958,, No. 33, pp. 3-4, illus.

Early, mid-season and late varieties are recommended.

5368. FINCH, C. G.
Early cauliflower variety trials, 1954-57.
Exp. Hort., 1960, No. 3, pp. 29-36,

A condensed version of *H.A.*, 29: 3578.

5369. Warne, L. G. G.
This vegetable springs a surprise.
Grower, 1960, **53**: 1353-4.

Trials with 11 strains of calabrese [a form of broccoli] sown in the summer of 1959 have shown that in suitable localities in Britain some strains can survive the winter. Most of the strains tested showed over 80% survival, but as the winter of 1959-60 was relatively mild further trials will be necessary.—Univ. Manchester.

5370. Honma, S.
Spartan Early—a new variety of broccoli.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 470-3, illus.

Spartan Early plants were uniform, matured 10–14 days earlier and gave a higher yield than Green Mountain, from which this variety was derived. The central heads were 6–8 in. in diameter. Only 3 days elapsed between the maturity of the earliest and latest central heads in Spartan Early, compared with 23 days for Green Mountain. The new variety was also superior when frozen or cooked.

5371. Singh, H. B., and others.
Seeds of "Snowball" can be raised in Kulu valley.
Indian Fmg, 1960, **9**(10): 6-8, illus.

Management, pest control, yields and economics of seed production of the late cauliflower variety Snowball-16.

5372. Szklarski, A.
Badania nad ulepszeniem metody hodowli kapusty wczesnej. (**Studies on an improved method of obtaining seed of an early cabbage.**) [English and Russian summaries 1 p. each.]
Biul. Warzyw., 1959, **4**: 407-24, bibl. 17, illus.

Seed was successfully obtained from the secondary heads formed on the early cabbage variety Ditmar after the main crop had been harvested in June. The highest seed yields were obtained when individual secondary heads were removed from the plant and rooted in pots in hotbeds in the autumn, or were stored in pits during the winter and rooted in pots in hotbeds in the spring. Plants with all their secondary heads intact or with 2, 3 or 4 heads gave lower seed yields, as did the heads of summer sown plants after winter storage in pots. Storing the heads of summer sown plants in sand in pits during the winter was not satisfactory.

5373. Rondomański, W.
Zaprawianie nasion kapusty suchymi zaprawami. (**Treatment of cabbage seeds with chemical dusts.**) [English and Russian summaries ⅓ p. each.]
Biul. Warzyw., 1959, **4**: 437-50, bibl. 10.

Seeds of Amager cabbage were dusted with 11 different preparations at the rate of 3 g./kg. seeds, just before sowing and also before 11 months of storage. Germisan proved the most efficient when applied before sowing, but where seeds were stored for 11 months Spergon was the most effective. In most cases a slight increase was noted in the percentage germination of treated seeds.

5374. Nieć, H., and Golińska-Noszczyńska, K.
Badania nad przygotowaniem rozsady wczesnej kapusty z wysiewu nasion wprost do doniczik. (**Studies on raising early cabbage plants by sowing seed directly in flower pots.**) [English and Russian summaries ¼ p. each.]
Biul. Warzyw., 1959, **4**: 191-6, bibl. 3.

Although raising seedlings without pricking-out did not increase total or early yields, the seedlings grew more rapidly and production costs were lower.

5375. Skąpski, H.
Reagowanie kilku odmian kalarepy na rósna temperaturę w okresie produkcji rozsady. (**The reaction of several kohl-rabi varieties to various temperatures during the seedling stage.**) [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 197-205, bibl. 5.

The variety Roggli was the best of 4 tested for early production, in as much as exposure to 10° C. for over 50 days, including 28 days below 5° C., did not induce flower formation. The Vienna White and Delicatess White varieties were not suitable, as 50% of the plants flowered after 10–15 days below 10° C. Plants grown at 10° C. had higher vitamin C contents than those grown at 15° C.

5376. Salter, P. J.
Irrigation of early summer cauliflower.
Agriculture, Lond., 1960, **67**: 59-62, bibl. 6.

Once cauliflower plants have become established they should be irrigated whenever the soil moisture deficit reaches 1 inch. [See also *H.A.*, 29: 1410.]—Nat. Veg. Res. Stat., Wellesbourne, Warwick.

5377. Choudhury, B.
Nutrient supply of cauliflower through well irrigation.
Sci. and Cult., 1960, **25**: 691-2.

A well water found to supply most of the N and all the K needed by cauliflower.

5378. Dreibrodt, L.
Beziehungen zwischen Düngung, Witterung, Wasserversorgung und Ertrag verschiedener Kohlarten. (**Relationships between manuring, weather, water supply and yields of different species of the cabbage family.**) [Russian and English summaries 14 and 11 lines.]
Arch. Gartenb., 1960, **8**: 75-84, bibl. 9.

Several crucifer species gave high yields with an N application of 210 kg./ha. Relative increases in yield, however, resulting from graded fertilizer applications depended on the weather. In all the early maturing varieties studied N manuring produced the biggest increases in yield when rain was plentiful in May and the temperature was high. When equal amounts of water were supplied to cauliflower and kohl rabi crops at different developmental stages, the highest yields were obtained in plots where the water was supplied during the later stages of growth.—Inst. Obst-u.-Gemüseb., Martin-Luther-Univ., Halle-Wittenberg.

5379. Barák, J.

Vliv přímého postřiku odpadní čpavkovou vodou na výnos a obsah vitaminu C u červené ředkvičky a bílého zelí. **(The effect of direct spraying with waste ammonia water on the yield and vitamin C content of radish and cabbage.)** [Russian and German summaries ½ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 1317-24, bibl. 11.

Ammonia water in 1 : 2, 1 : 5, 1 : 10 and 1 : 20 concentrations was applied 3 times at weekly intervals to pot grown radish and cabbage plants. With radish the 1 : 5 dilution was most effective during the growing period, but the 1 : 2 dilution, which initially caused growth depression and leaf burn, gave the highest yield. Cabbage suffered no injury and reacted most favourably to the 1 : 2 dilution. Although the percentage of vitamin C, after an initial rise at the lowest level of N, fell with increasing N concentrations, the total content of vitamin C was greatest at the highest N level.

5380. Hori, Y., and others.

On the decline of early spring cabbage production and the occurrence of the so-called heart rot in Fuji city, an example of deterioration of soil productivity in vegetable areas. III. [Japanese, with English summary 1 p.]

J. hort. Ass. Japan, 1959, **28**: 267-76, bibl. 6, illus.

A sharp drop in the production of cabbages in the central area of the Fuji district, where cabbage has been grown continuously without crop rotation, was noted recently and thought to be due to heart rot caused by Ca deficiency and also to a severe infection of *Botrytis*. The effects of various culture solutions on Ca deficiency were investigated. Good growth was obtained in the standard (Ca at 7m.e./l.), —Ca (Ca at 1 m.e./l.) + K and —Ca + Na solutions, but growth was poor in —Ca × 3 and in —Ca + Mg. Visible deficiency symptoms appeared only in the —Ca × 3 treatment before heading, but were present in the head leaves of all but the standard. Soft rot bacteria infected the outer head leaves just before harvesting and were most severe in the —Ca + Mg and —Ca + K treatments but almost non-existent in the standard treatment. A foliar application of Ca was effective on the plants treated with —Ca + Mg. [For part II, see *H.A.*, 29: 2505.]

5381. Maljuganova, T.

The effect of microelements on the productivity and quality of cauliflower. [Russian.]

Sb. stud. nauč.-issled. Rabot. Mosk. s.-h. Akad. im. K.A. Timirjazeva, 1958, No. 8, pp. 150-2, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,304.

An application of boric acid gave 320 standard cauliflower heads weighing 182 kg. per 100 sq. m., a mixture of manganese sulphate and ammonium molybdate 304 heads weighing 168 kg., manganese sulphate or ammonium molybdate applied separately 300 heads weighing 166 kg. and NPK without trace elements 210 heads weighing 140 kg. The cauliflowers receiving the Mo-Mn mixture had the highest contents of sugars, N compounds and vitamin C and also had the best flavour.

5382. Nieuwhof, M.

Rand in wittekool. **(Tipburn in white cabbage.)** [English summary 14 lines.]

Meded. Dir. Tuinb., 1960, **23**: 102-6, illus.

Varieties and strains of cabbage showed considerable differences in susceptibility to tipburn, and it is considered that resistance could be improved by selection. The application of N, early sowing and planting and late harvesting tended to increase the amount of tipburn indirectly by increasing the weight of head produced. The only direct effect on tipburn, independent of the effect on weight of head, was produced by late harvesting at the end of the season.—I.V.T., Wageningen.

5383. Lamb, K. P.

Field trial of eight varieties of brassica field crops in the Auckland district. 1. Susceptibility to aphids and virus diseases.

N.Z. J. agric. Res., 1960, **3**: 320-31, bibl. 9.

Broad leaf Essex rape and Superlative swede were highly susceptible to *Brevicoryne brassicae*, Wye swede and marrow-stem kale were moderately susceptible, Doon Spartan and Calder swede showed resistance, and York Globe and Green Globe turnips were highly resistant. Calder and Doon Spartan swedes and marrow-stem kale were highly resistant to turnip mosaic and together with Wye swede moderately resistant to cauliflower mosaic. The turnips were susceptible to both viruses. Marrow-stem kale and Doon Spartan swede were outstanding for winter survival and yield. [From author's summary]—D.S.I.R., Auckland.

5384. Sherf, A.

Cabbage disease strikes.

Amer. Veg. Gr, 1960, **8**(4): 43, illus.

The only certain control measure for *Alternaria* black leafspot is the use of a fungicide, such as maneb, zineb, or nabam with zinc, applied 3 or 4 times per crop.—Cornell Univ.

5385. Heitefuss, R., Stahmann, M. A., and Walker, J. C.
Production of pectolytic enzymes and fusaric acid by *Fusarium oxysporum* f. *conglutinans* in relation to cabbage yellows.
Phytopathology, 1960, **50**: 367-70, bibl. 13.

As fusaric acid was not found in diseased cabbage tissues it appears to be of little or no importance in the production of yellows symptoms.

5386. Heitefuss, R., Stahmann, M. A., and Walker, J. C.
Oxidative enzymes in cabbage infected by *Fusarium oxysporum* f. *conglutinans*.
Phytopathology, 1960, **50**: 370-5, bibl. 21.

Respiration and oxidative enzyme activity were studied in inoculated and non-inoculated cabbage plants resistant and susceptible to the fungus. Respiration was slightly increased in leaves of the susceptible variety 8 and 16 days after inoculation. The oxidation of ascorbic acid at 4 days was 2·5 times greater in inoculated resistant than in inoculated susceptible cuttings. At 8 days this activity had declined in resistant cuttings to that of healthy controls, but in susceptible cuttings it continued to rise. The activity was 41% and 113% higher in leaf extracts of inoculated susceptible plants than in comparable extracts of healthy plants at 8 and 16 days, respectively. The total ascorbic acid content of susceptible inoculated plants at 14 days was about half that of healthy plants. Peroxidase activity at 8 days in inoculated susceptible cuttings was increased 132%. It is believed that the peroxidase was formed by the host. [From author's summary.]—Wis. agric. Exp. Stat.

5387. Channon, A. G., and Keyworth, W. G.
Field trials of the effect of aldrin on clubroot of summer cabbage.
Ann. appl. Biol., 1960, **48**: 1-7, bibl. 6.

Trials over 3 years have shown that aldrin will reduce clubroot, especially when applied as a liquid spot treatment soon after planting. Emulsions at rates of $\frac{1}{4}$ pint of 0·08–0·27% aldrin or $\frac{1}{2}$ pint of 0·04–0·135% aldrin per plant were used. The differences between the $\frac{1}{4}$-and $\frac{1}{2}$-pint treatments were not significant, but the $\frac{1}{2}$-pint treatments were slightly more effective, probably because of the greater penetration of the larger quantities of liquid. The higher the aldrin percentage, the greater was the clubroot control. The higher rates were slightly phytotoxic to the young cabbages but did not affect later growth. The highest yields followed the use of $\frac{1}{2}$ pint of 0·06% aldrin per plant. Lime, applied as ground limestone at 3·5 tons per acre, gave clubroot control equal to that of the highest aldrin treatment. Lime plus aldrin gave a further reduction in clubroot.—Nat. Veg. Res. Stat., Wellesbourne, Warwick.

5388. Noll, J.
Über den Einfluss von Temperatur und Bodenfeuchtigkeit auf die Larven und Puppen der Kohldrehherzmücke (*Contarinia nasturtii* Kieffer) als Grundlage für die Vorausberechnung des ersten Schlüpftermins im Frühjahr. (**The effects of temperature and soil moisture on the larvae and pupae of the cabbage gall midge (*Contarinia nasturtii*) as a basis for forecasting the date of first emergence in spring.**) [Russian and English summaries $\frac{1}{4}$ p. each].
Arch. Gartenb., 1959, **7**: 362-415, bibl. 52.

An entomological study; forecasting should be helpful in planning insecticide applications.

5389. Todd, D. H.
Virus disease effectively controls white butterfly.
N.Z. J. Agric., 1960, **100**: 83-5, bibl. 1, illus.

Usually making insecticidal treatment of brassicas unnecessary in North Island.

5390. Kulpe, M.
Qualitätsprüfungen an Kopfkohl (*Brassica oleracea* L., var *capitata* L.) und Blumenkohl (*Brassica oleracea* L., var *botrytis* L.) bei vergleichender Lagerung . . . (**Quality testing of cabbages and cauliflowers after storage in vegetable storage houses, in cellars and in clamps, as well as studies on forecasting the keeping quality of cabbages.**)
From abstr. in *Kühn-Arch.*, 1959, **73**: 308-9.

Of the three methods of storage compared, clamps were found to be unsuitable for cabbages and cauliflowers in East Germany, while the vegetable storage house proved superior to the cellar because of its better ventilation. Cabbages grown in the coastal area showed inferior keeping quality to cabbages grown inland. Analyses of the essential constituents of cabbages and cauliflowers at the time of harvesting did not provide a clue to their keeping quality. The following processes were found to occur during storage: A reduction in dry matter and vitamin C content, an increase in acidity and frequently a decrease in the viscosity and refractive index of the press juice. Several fungicides reduced losses from rotting. With freshly harvested cabbages rotting tests and the percentage reduction in dry matter during the first 10 days of storage gave a good indication of their future keeping quality.—Martin-Luther-Univ., Halle-Wittenberg.

5391. Ivanova, T. M., and Rubin, B. A.
On the oxidative function of peroxidase of *Brassica oleracea*. [Russian, with English summary 7 lines.]
Biohimija, 1960, **25**: 496-504, bibl. 25.

Oxidizes phloroglucin but not ascorbic acid or cytochrome.

5392. SEDLÁK, J.
Level of sulphydryl compounds in rat liver following feeding with goitrogenous and non-goitrogenous cabbage.
Nature, 1960, **186**: 892-3, bibl. 6.

Feeding experiments are described using 2 variants of cabbage grown in sand culture. The rats fed with the goitrogenous variant stored twice as much sulphydryl compounds in their livers as those fed on non-goitrogenous cabbage. It is suggested that the estimation of these compounds in experimental animals may provide a means of determining the goitrogenicity of vegetable foodstuffs.—Endocrin. Inst., Slovak Acad. Sci., Bratislava,

Celery.

(*See also* 5356, 6298.)

5393. LUCAS, R. E., AND WITTWER, S. H.
Celery production in Michigan.
Ext. Bull. Mich. St. Univ. **339,** 1956, pp. 26, illus.

Varieties, management, plant protection, marketing.

5394. (HALL, B. J.)
Effect of plant spacing [in celery].
Asgrow Fmr, condensed in *N.Z. Comm. Gr*, 1960, **15**(8): 14.

Results of trials to study the effect of spacing on total yield, head size and incidence of pink rot in the Utah variety of celery showed that, with the standard spacing of 30 in. between rows, large plants produced the largest yields and head size and showed the least infection of pink rot at a 7 in. spacing in the rows, but medium and small plants produced larger yields and heads with 4 in. spacing.

5395. BERGMAN, E. L.
Celery blackheart and its control in Pennsylvania.
Progr. Rep. Pa agric. Exp. Stat. **215,** 1960, pp. 5, bibl. 7, illus.

This condition appeared to be due to deficient Ca or excess K or both. Available K in the soil should not exceed 375 lb./acre. The condition also resembled B-toxicity symptoms. Weekly irrigations of at least 1 in. of water aided control.

5396. MARSHALL, G. M.
The incidence of certain seed-borne diseases in commercial seed samples. III. *Septoria* leaf spot, or blight, of celery.
Ann. appl. Biol., 1960, **48**: 27-33, bibl. 7.

The similarity between the percentage germination of healthy seeds and those affected by *Septoria* spp. showed that the disease does not affect germination. No effect of variety or season on the incidence of the disease was found; 20% of the total number of samples being affected.—Official Seed Test. Stat., Cambridge.

5397. MURAKISHI, H. H., HONMA, S., AND KNUTSON, R.
A seedling test for determining resistance in celery to *Cercospora* early blight.
From abstr. in *Phytopathology*, 1959, **49**: 546.

The fungus was found to sporulate abundantly on Kilpatrick's carrot-leaf agar. An aqueous suspension containing 5,000–10,000 conidia per ml. was atomized on seedlings at the 4- to 6-leaf stage. Plants were placed immediately in a humidity chamber and held at 75–80° F, for 48–72 hours. Disease incidence was recorded after 10–14 days in the greenhouse. A close correlation was found to exist between field and greenhouse tests.

Cucurbits.

(*See also* 4689, 4730, 4749, 4753, 4815, 5322, 5325, 5328, 5343, 6298.)

5398. MINISTRY OF AGRICULTURE, LONDON.
Cucumber growing.
Adv. Leafl. Minist. Agric., Lond. **475,** 1959, pp. 7.

Types of glasshouse, varieties, propagation, artificial illumination, fertilization, marketing and control of pests and diseases.

5399. DE ZEEUW, A., AND VAN VEEN, J.
Kostprijzen van platglaskomkommers en aanvullende teelten. **(Cost prices of frame cucumbers and supplementary crops.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1959, **22**: 695-703, bibl. 1.

An analysis of costs of production of early cucumbers in frames, with lettuces and cauliflowers as supplementary crops.

5400. BOWERS, J. L.
Slicer cucumber varieties for Arkansas.
Ark. Fm Res., 1960, **9**(1): 11, illus.

Ashley proved superior to Marketer in yield, fruit quality and disease resistance. Palomar produced higher yields than Ashley but had inferior fruit colour and shape. The SC lines had good fruit colour and shape; SC 53-C was outstanding, and all showed promise of disease resistance.

5401. EHRLE, L.
Ertragsleistungen und Marktwert einiger bitterstofffreier und krätzeresistenter Gurkensorten. **(Yields and market value of some cucumber varieties free from bitter principles and resistant to gummosis.)**
Gartenwelt, 1960, **60**: 191-2, bibl. 1.

In a comparison of 9 varieties Flamex, Vugrostan, Bittex and Vurex proved superior to the standard variety Orion in respect of yield and market value. —Rhein. Lehr-u .Versuchsanst. f. Gemüse-, Obst-u. Gartenb., Straelen.

5402. Harvey, H. L.
Mosaic disease of cucumbers: a new resistant variety.
J. Agric. W. Aust., 1960, **1**: 337-40, bibl. 2, illus.

Symptoms of the disease, which has been controlled by reducing aphid populations by weed control, insecticides and garden sanitation, are described. The variety Ohio MR 200 is highly resistant.

5403. Korek, M., Miernik, B., and Walent, A.
Czy dorodność nasion ogórków odmiany "Borszczagowskie" wpływa na plon owoców? **(Does the quality of cucumber seeds (var. Borszczagowskie) influence yields?)** [English and Russian summaries ¼ p. each.]
Biul. Warzyw., 1959, **4**: 167-74, bibl. 11.

Only insignificant increases in early yield were obtained by planting heavier seeds. In any case grading seeds would not be worth while, because the percentage of heavy seeds in this variety is small, and, being a late variety, increases in total yield would be negligible.

5404. Nieć, H.
Szczepienie ogórków szklarniowych na dyni figolistnej. **(Grafting hothouse cucumbers on *Cucurbita ficifolia*.)**
Biul. Warzyw., 1959, **4**: 333-8, bibl. 7.

A good union is obtained provided (a) the cucumbers are sown 7–8 days before the *C. ficifolia*, (b) grafting is done at an acute angle and the graft is properly bound and (c) growing conditions are good. The grafted cucumbers developed normally and yielded 36% more fruit than ungrafted plants.

5405. Styczyńska, J.
Próby rozmnażania w Polsce dyni figolistnej—podkładki do szczepienia ogórków w uprawie pod szkłem. **(Efforts to propagate *Cucurbita ficifolia* in Poland for use as a rootstock for grafting cucumbers cultivated under glass.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 383-90, bibl. 9, illus.

Cucurbita ficifolia is used as rootstock for cucumbers to protect them from soil-borne diseases such as *Fusarium* and *Verticillium.* Large numbers of seeds are required for this purpose, but fruits of this species do not ripen in the open in Poland. Trials showed, however, that the seeds will mature satisfactorily in the fruit after harvesting, and the required after-ripening can take place either in the fruit or after removal from the fruit. The quality and viability of seeds obtained in this way were satisfactory.

5406. van den Ende, J.
Druppelbevloeiing bij platglaskomkommers. **(Trickle irrigation of frame-grown cucumbers.)**
Stikstof, 1959, **2**: 430-41, bibl. 8, illus., reprinted as *Publ. Proefst. Groent. Fruit. Glas, Naaldwijk*, **76**, fl.0.75.

In 2 experiments comparing trickle irrigation with hose watering in frames, the former increased cucumber yields by 18% and 22%, respectively. The use of a nutrient solution containing N, K_2O and MgO in the ratio of 1 : 1 : 0·5 gave much better results than a solution in which the Mg was replaced by an equivalent amount of Ca.

5407. Choudhury, B., and Phatak, S. C.
Sex expression and sex ratio in cucumber (*Cucumis sativus* L.) as affected by plant regulator sprays.
Indian J. Hort., 1959, **16**: 162-9, bibl. 25.

Various concentrations of MH, NAA, IAA and 2,4-D were used. All treatments increased the female to male flower ratio and induced the appearance of the 1st female flower on lower nodes than in the control. MH at 200 p.p.m. and NAA at 100 p.p.m. significantly increased the number of female flowers and MH at 600 and 500 p.p.m., NAA at 100 p.p.m. and IAA at 100 and 200 p.p.m. reduced the number of male flowers. NAA at 100 p.p.m. gave the highest female to male ratio. MH at 800 p.p.m. induced the greatest pollen sterility, the effect being temporary. IAA at 100 and 200 p.p.m. and NAA at 200 p.p.m. stimulated plant growth, and MH at all concentrations suppressed apical growth, though only temporarily except in the case of 800 p.p.m.—Indian agric. Res. Inst., New Delhi.

5408. Peterson, C. E., and Anhder, L. D.
Induction of staminate flowers on gynoecious cucumbers with gibberellin A_3.
Science, 1960, **131**: 1673-4, bibl. 8.

Gibberellin A_3 was applied to female cucumber plants at various concentrations up to 5,000 p.p.m. Applied at 2,000 p.p.m. at the first true leaf stage and again 14 days later, it induced the formation of 10·9 staminate flowers per 100 nodes. This method permits the increase of inbred lines normally bearing only pistillate flowers.—Mich. St. Univ., E. Lansing.

5409. Markov, I., and Romančuk, I.
Pollination of cucumbers by bees. [Russian.]
Sel'. Hoz. Sibiri, 1959, No. 2, pp. 53-4.

In greenhouse experiments artificially pollinated cucumber plants yielded 7·3 kg. of fruit per unit area, whereas a similar number of bee-pollinated plants yielded 11·8 kg.

5410. Filov, A. I.
The systematics of melons. [Russian].
Vestn. s.-h. Nauki, 1960, **5**(1): 126-32, bibl. 34, illus.

Following a review of the literature *Cucurbita melo* is grouped into 6 subspecies, i.e. ssp. *rigidus* comprising 5 botanical varieties, ssp. *europaeus* 5 varieties, ssp. *orientale* 3 varieties, ssp. *flexuosus* 2 varieties, ssp. *sinensis* 3 varieties and ssp. *spontaneum* 3 varieties; they are described briefly in Latin.

5411. Orphanides, J.
Melon trials carried out in 1958-59.
Countryman, Nicosia, Feb. 1960, pp. 24-5.

Of 29 varieties compared in 1958 the Israeli variety Ananas Yoknean gave the highest yield, but although it is of good quality it will not travel and is therefore only suitable for local consumption. Of 8 exportable varieties compared in 1959 the local Yellow Honey Dew was the heaviest cropper, closely followed by the U.S. varieties Honey Dew, Green Flesh and Persian Medium.

5412. Windham, S. L.
Four cantaloupe varieties compared at Crystal Springs.
Miss. Fm Res., 1960, **23**(2): 3.

Hales Best No. 36, Edisto, Rio Gold and Home Garden were grown in 2 ways, namely direct seeding and transplanting in 3-in. peat pots. Rio Gold gave the heaviest yield, the fruit being medium sized. Edisto produced larger fruit but a lower total yield. With all varieties transplanted stock produced higher yields.

5413. (Peterson, L. E.)
Get early yield when muskmelons are transplanted.
Ia Fm Sci., 1960, **14**(9): 13.

Muskmelons grown in a hotbed and transplanted matured 7 days earlier than field-sown crops. The best of 3 dates for sowing in the hotbed was April 10. Spacing in the field of 2 ft. apart gave slightly higher yields than 4 ft. spacing with 2 plants per site.

5414. Kretovič, V. L., Evstigneeva, Z. G., and Aseeva, K. B.
The assimilation of labelled ammonium from the soil by the root system. [Russian, with English summary ⅓ p.]
Biohimija, 1960, **25**: 476-81, bibl. 16.

In pumpkins grown in soil treated with $N^{15}H_4NO_3$ the NH_4 radicle was rapidly absorbed, part being metabolized into organic form in the root system, its entry into the amido group of both asparagine and glutamine being particularly marked. There was some evidence of its participation in the synthesis of ascending sap protein.—Inst. Biochem., Moscow.

5415. (Peterson, L. E.)
Vegetable varieties compared in trials.
Ia Fm Sci., 1960, **14**(9): 13-14.

Blackstone watermelon outstanding because of resistance to anthracnose; Hope Diamond promising.

5416. Ivanoff, S. S., and others.
Study shows advantages of transplanting watermelons.
Miss. Fm Res., 1960, **23**(1): 1,4,5, illus.

Experiments in 1958 showed that transplanting, using pots, more than doubled the number of melons and almost trebled the total yield per acre compared with direct seeding. When transplanted the individual melons were larger and ripened earlier. The best pots were those made of cattle manure, followed by peat moss and paper pots. In 1959 4 lb. of Alanap-3 in 40 gal. per acre, applied a day or two before planting the melons, gave good weed control. A prototype machine capable of transplanting and watering the plants at the same time has been developed.

5417. Chopra, V. L., and Swaminathan, M. S.
Induction of polyploidy in watermelon.
Proc. Indian Acad. Sci., Sect. B, 1960, **51**: 57-65, bibl. 9, illus.

Treatment of seedlings by the drop method in the cotyledon stage with an emulsion of 0·2% colchicine, stearic acid, morpholine and lanoline produced the highest number of polyploids (38·59%). The periodic application of drops of 0·4% colchicine was somewhat less effective. Seed fertility in tetraploid plants was greatly reduced, and triploid seeds germinated only when the seed coat was partly removed. Fruits set on a triploid plant had seeds without embryos.—Indian agric. Res. Inst., New Delhi.

5418. Spire, D.
Les viroses des cucurbitacées. (**The virus diseases of cucurbits.**)
Ann. Soc. nat. Hort. France, 1960, **6**: 19-23, bibl. 8, illus.

A review, covering symptoms and transmission, with lists of cultivated and wild host plants of cucumber virus 1.

5419. Martin, M. W.
Inheritance and nature of cucumber mosaic virus resistance in squash.
Diss. Abstr., 1960, **20**: 3462, being *L.C. Card No. Mic.* 60-617 of 198 pp.

In inoculation tests lowering the light intensity or applying N to the plants or soil markedly increased the susceptibility of squash plants to CMV infection. Inheritance studies are also described.—Cornell Univ.

5420. Flock, R. A., Laird, E. F., Jr., and Dickson, R. C.
Loss caused by late infection of cantaloupes by the curly top virus.
Phytopathology, 1960, **50**: 327-8, bibl. 4.

The yield reduction was shown to be more serious than has generally been recognized.

5421. Goode, M. J., and Reading, G. D.
Controlling watermelon leaf diseases with fungicide sprays.
Ark. Fm Res., 1960, **9**(2): 4, illus.

Symptoms of anthracnose (*Colletotrichum lagenarium*) and cercospora leaf spot (*C. citrullina*) are described. Anthracnose may be controlled by preventive practices or by the use of resistant varieties, but all varieties are susceptible to cercospora. Good control under severe disease conditions was obtained, when only cercospora was present, with maneb (70%) at 1½ lb./100 gal./acre and zineb (65%) at 2 lb./100 gal./acre, and, when both diseases were present, with maneb (70%) at 2 lb./100 gal./acre and zineb (65%) at 2 lb./100 gal./acre, all treatments being repeated every 7 days.

5422. Chiu, W. F., Liang, S. S., and Hwang, C. S.
Field trials on controlling the cucumber mildews. [Chinese, with English summary ⅔ p.]
Acta phytopath. sin., 1959, **5**: 123-31, bibl. 8.

Bordeaux 1 : 1.5 : 200–300 and copper stearate 1 : 4–6 : 800 were effective against both downy mildew (*Pseudoperonospora cubensis*) and powdery mildew (*Sphaerotheca humuli* var. *fuligena*), but the stearate was the better against the powdery mildew. The addition of 0·5% resin solution to bordeaux increased its effectiveness during the rainy season. A 1 : 1 mixture of 1% copper sulphate and 5% washing soap solutions was easily prepared, very effective and gave a higher yield. Dithane (1 : 800) applied alone only controlled downy mildew, but the addition of 0·2% colloidal sulphur made it also effective against powdery mildew.—Peking Univ. Agric.

5423. Cohen, S. I., Reinhart, J. H., and Ristich, S. S.
Systemic disease control by 2-pyridinethiol-1-oxide and its derivatives.
From abstr. in *Phytopathology*, 1960, **50**: 239.

Certain derivatives of 2-pyridinethiol-1-oxide (Omadine) have been found that control anthracnose and fusarium wilt of cucumber and early blight of tomato by upward and downward translocation after leaf, soil or seed application.

5424. Ashworth, L. J., Jr.
The relation of total sugars to susceptibility of Persian melon seedlings to *Macrophomina phaseoli*.
From abstr. in *Phytopathology*, 1959, **49**: 533.

Growing seedlings in culture media with added dextrose indicated that conditions favouring the development of high concentrations of sugars in the plants predispose them to infection.

5425. Winstead, N. N., and McCombs, C. L.
Amino acid and sugar changes in cucumber fruits infected with *Pythium aphanidermatum*.
From abstr. in *Phytopathology*, 1959, **49**: 554-5.

5426. Anon.
Tres plagas del melón: áfidos, pasador de la hoja y perdorador del fruto. (**Three melon pests: aphids, leaf miners and fruit borers.**)
Not. agríc. Serv. Shell Agric., Cagua, 1960, **2**: 49-51, illus.

Control of *Aphis gossypii*, *Agromyza* spp. and *Diaphania nitidalis* in Venezuela.

5427. Huang, T., and Cheng, K. H.
A demonstration on melon fly control. [Chinese, with English summary 1 p.]
[*Publ.*] *Taiwan agric. Res. Inst.*, 1959, pp. 14, bibl. 10, illus.

Cucumber treated with protein hydrolysate (0·25%) plus malathion w.p. (0·125%) or Dipterex (0·125%) for the control of *Dacus cucurbitae* produced 93·57% sound fruit, 5·33% malformed fruit, and 1·10% rotted fruit compared with untreated plants, which produced 58·85% sound fruit, 26·91% malformed fruit and 14·24% rotted fruit. Yields of the treated crops were also higher. Malathion was inferior to Dipterex, and better results were obtained by spraying every row instead of alternate rows. Sprays of Orthocide w.p. 0·125% applied every 6–7 days from the 5–6-leaf stage until early harvest gave some control of downy mildew, prolonged the life of the plants and increased yields.

5428. Lall, B. S., and Sinha, S. N.
A trap for the control of the melon fly, *Dacus cucurbitae* Coq., Diptera: Trypetidae.
Sci. and Cult., 1960, **25**: 544-6, bibl. 11, illus.

Of 5 baits tested in a newly-devised trap the most effective consisted of a mixture of fermented palm juice, saturated sugar solution and toddy. A month's trial in a field of bitter gourds reduced infestation from 37·3% to 19·7%. In all cases more females were trapped than males.—Bihar agric. Coll., Sabour.

5429. Reid, W. J., Jr., and Cuthbert, F. P., Jr.
The pickleworm, how to control it.
Leafl. U.S. Dep. Agric. **455,** 1960, illus., pp. 7.

Diaphania nitidalis on cucumbers.

5430. Anon.
Aplicación de nematicidas en melones. (**Nematicide application in melon growing.**)
Not. agríc. Serv. Shell agric., Cagua, 1958, No. 34, pp. 2-3, illus.

Control of *Meloidogyne incognita* with DD in Venezuela.

5431. Johnston, M. R.
Lindane residue in the fermentation and processing of pickles. Part I. Changes in lindane residue. Part II. Brining and curing of cucumbers. Part III. Pickle flavor changes due to lindane residue.
Res. Bulls Mo. agric. Exp. Stat. **630**, 1957, pp. 16, bibl. 9; **698,** 1959, pp. 91, bibl. 108; and **703,** 1959, pp. 36, bibl. 74.

The first part indicates that, although the residues of lindane in pickles made from cucumbers sprayed in the field were insignificant, they could amount to 10 p.p.m. if the harvested fruit were sprayed. In the second part it is stated that no effect on the fermentation organisms could be established when a recommended lindane insect control schedule was used, but exaggerated methods did adversely affect the process. The third part reports that the effect of lindane residues on flavour was unnoticeable following the normal control schedule, but that direct spraying of harvested cucumbers produced a pickle with inferior flavour.

Legumes—beans.

(*See also* 4653, 4699, 4704, 4710-4712, 4725, 4730, 4755, 5322, 5472, 5478, 5522, 5523, 6314.)

5432. Williams, E. P.
Bean seed production in the Burdekin Valley.
Qd agric. J., 1959, **85** : 811-14, illus.

Methods adopted for producing French bean seeds; a comparatively recent development in Queensland.

5433. Pullen, W. E., and Hutchinson, F. E.
There's a profit in snap bean production.
Me Fm Res., 1960, **7**(4): 11-14, illus.

Using fertilizers, pre-emergence herbicides, malathion against Mexican bean beetle and mechanical harvesting; costs are tabulated.

5434. Hammett, H. L.
Snap beans, pole and bush, tested at State College.
Miss. Fm Res., 1960, **23**(2): 3, 5.

Blue Lake was the highest yielding pole snap bean and Extender the highest yielding and earliest bush snap bean. Extender was highly rated for its processing qualities.

5435. Zaumeyer, W. J., Thomas, H. R., and Afanasiev, M. M.
New Great Northern Bean.
Agric. Res. Wash., 1960, **8**(10): 15.

Great Northern 1140 is an early maturing, high yielding dry bean, resistant to common bean mosaic and several strains of rust.

5436. Cardona, C., Camacho, L. H., and Orozco, S. H.
Diacol Nima, variedad mejorada de fríjol. **(Diacol Nima, an improved bean variety.)**
Bol. Divulg. D.I.A. Estac. agríc. exp. Palmira **8,** 1959, pp. 24, illus.

Description of a dwarf variety highly recommended for the Valle del Cauca region of Colombia, with notes on its cultivation.

5437. Toole, E. H., and Toole, V. K.
Viability of stored snap bean seed as affected by threshing and processing injury.
Tech. Bull. U.S. Dep. Agric. **1213,** 1960, pp. 9, bibl. 4.

Seed of 5 varieties was commercially processed and stored for 33 to 45 months in open warehouses or in controlled conditions at several places. Controlled storage maintained viability better than open storage, especially where temperature and humidity were high. Seeds of the varieties Brittlewax and Plentiful deteriorated more quickly than those of the other 3 varieties.

5438. Riepma, P., van Huisseling, P. G. W., and Bom, G. J.
Stikstofbemesting bij stambonen (*Phaseolus vulgaris.*) (**Nitrogen manuring of dwarf beans.**) [English summary 1½ pp.]
Meded. Proefst. Akker- en Weidebouw Wageningen **36,** 1960, pp. 31, bibl. 24.

Trials over a period of 3 years showed that increasing the rate of N application from 0 to 80 kg./ha. increased the yield of dwarf haricot beans by an average of 5 kg. beans per ha. per kg. N. The amount of yield increase, however, varied greatly from place to place, and this variation is considered to be due to some still unexplained relationship between the N fertilizers and nitrifying bacteria. Increasing the rate of N application, however, also delayed ripening and drying, which in wet seasons may have an undesirable effect on quality. Provisionally a rate of 40–60 kg. N per ha. is recommended.

5439. Neher, D. D.
The effect of nutrient levels in nutrient cultures on the translocation of foliar applied nutrients.
Diss. Abstr., 1960, **20**: 2472, being *L.C. Card No. Mic.* 59-3978 of 73 pp.

In greenhouse experiments individual variables of pH and 7 elements were applied in a nutrient solution, in which red kidney beans were grown to determine their effects on the translocation of foliar applied ferric chloride and DTPA-Fe. A pH of 7·5 enhanced the translocation of foliar applied Fe over that of pH 5. The foliar applied DTPA-Fe resulted in more translocation of Fe than the foliar applied ferric chloride or than Fe in the nutrient solution. No interactions or metal treatments showed significant effects on translocation. In a plant growth room study only pH 5 was used together with ferric chloride as the foliar application. High levels of P, Mn, Zn, Fe and Ca $(NO_3)_2$ significantly reduced the translocation of Fe compared with that in control plants, which received low levels of P and Fe in the nutrient solution.—Utah St. Univ.

5440. Wheeler, A. W.
Changes in a leaf-growth substance in cotyledons and primary leaves during the growth of dwarf bean seedlings.
J. exp. Bot., 1960, **11**: 217-26, bibl. 16.

A leaf-growth substance with the same Rf value as GA was found in extracts from the primary leaves and cotyledons of seedlings grown in the dark. In the cotyledons the amount of leaf-growth substance reached a maximum on the 4th day, whether the plants were grown in the light or dark. In primary leaves grown in the light the leaf-growth substance content reached its maximum later than in the cotyledons, the time coinciding with the maximum growth rate of the primary leaves. Leaf-growth substances did not accumulate in the primary leaves of plants grown in the dark. [From authors' summary. See also *H.A.*, 29: 3613.]—Rothamsted exp. Stat.

5441. CORNUET, J.
La résistance des haricots aux maladies à virus. **(The resistance of french beans to virus diseases.)**
Ann. Soc. nat. Hort. France, 1960, **6**: 24-7, bibl. 5, illus.

Varietal resistance in *Phaseolus vulgaris* to common mosaic is discussed, and 48 climbing and dwarf varieties of French and other origin are classified according to their resistance. The resistance of several other *Phaseolus* spp. to common and yellow mosaic is also briefly dealt with.

5442. ERCOLANI, G. L.
Una batteriosi del fagiolo, nuova per l'Italia. **(A bacterial disease of beans new to Italy.)**
Ann. Sper. agrar., 1960, **14**(1), Suppl. pp. XV-XXXIII, bibl. 76, illus.

Pseudomonas medicaginis f. sp. *phaseolicola* and suggestions on prevention and control.

5443. ALLARD, C.
L'antracnose du haricot, *Colletotrichum lindemuthianum* (Sacc. & Magn.) Scribner. Conditions de réussite des traitements chimiques. **(Conditions needed for successful chemical treatment of haricot bean anthracnose.)**
Déf. Vég., 1959, **13**(73): 1-3.

Resistant varieties, clean seed and an open habit of growth.

5444. MALOY, O. C., AND BURKHOLDER, W. H.
Some effects of crop rotation on the *Fusarium* root rot of bean.
Phytopathology, 1959, **49**: 583-7, bibl. 14.

The effect of rotation and organic amendments on the severity of *Fusarium* root rot of beans (*Phaseolus vulgaris* L.) and on populations of *Fusarium solani* f. sp. *phaseoli*, bacteria, actinomycetes, fungi and *Pratylenchus* spp. was studied in field and greenhouse experiments. In the field wheat grown immediately preceding beans significantly reduced root rot; in the greenhouse alfalfa had the greatest effect. In the field no differences were observed among populations of the bean rot *Fusarium* in the differently cropped soils, although differences were significant in the greenhouse. Evidence indicated that relatively low populations of the *Fusarium* may induce high incidence of infection. Populations of *Pratylenchus* spp. were highest in roots of beans grown in soil previously cropped with wheat, and generally were recovered in greatest numbers from the cleanest roots. Crop residues or amendments had no apparent effect on populations of bacteria or actinomycetes, but affected fungi markedly, both quantitatively and qualitatively. No definite relationship was observed between the relative frequencies of nutritional groups of bacteria and root rot severity, though there were indications that root rot was associated with a high incidence of amino-acid-requiring bacteria. [Authors' summary.]—Cornell Univ., Ithaca.

5445. YEN, D. E., AND BRIEN, R. M.
French-bean rust (*Uromyces appendiculatus*). Studies on resistance and determination of rust races present in New Zealand.
N.Z. J. agric. Res., 1960, **3**: 358-63, bibl. 9.

Including studies on reactions of crosses between the resistant variety Westralia and susceptible varieties.

5446. DAVIS, D., BECKER, H. J., AND ROGERS, E. F.
The chemotherapy of wheat and bean rust diseases with sydnones.
Phytopathology, 1959, **49**: 821-3, bibl. 9.

In field trials for the control of bean rust (*Uromyces phaseoli*) 3-phenylsydnone and 4-bromo-3-phenylsydnone applied at 1,000 p.p.m. at weekly intervals markedly reduced disease but caused russeting.—Merck & Co., Rahway, N.J.

5447. BRAITHWAITE, B. M.
Spraying for bean fly control.
Banana Bull., 1960, **23**(4): 6.

With 0·05% D.D.T.

5448. WILCOX, J., AND HOWLAND, A. F.
Control of the two-spotted spider mite on beans with systemic insecticides applied in the soil.
J. econ. Ent., 1960, **53**: 224-7, bibl. 1.

Control of the two-spotted spider mite (*Tetranychus telarius* (L.)) on lima beans in southern California was obtained for 2 to 3 months by applying granulated or liquid insecticides in the seed furrow at planting time. Seed coatings were also effective. Phorate (formerly Thimet) and Di-Syston were used most extensively, but some of the other insecticides showed promise. Dosages of less than 1 lb. per acre were as effective as higher dosages and showed no appreciable phytotoxicity. Crop yields were increased and little or no residue was found in the dry beans. Higher dosages resulted in reduced plant stands. For the control of thrips (*Frankliniella moultoni* Perg.) phorate was better than Di-Syston, but 2 to 4 lb. per acre were required. [Authors' abstract].—U.S.D.A., Whittier, Calif.

5449. BOARD, P. W., AND COOTE, G. G.
Maturation of green stringless bush beans.
Tech. Publ. C.S.I.R.O. Aust., Div. Food Pres. Transport, **12**, 1959, pp. 12, from abstr. in *J. Sci. Food. Agric.*, 1960, **11**: i-302.

An attempt was made to develop methods for the short-term prediction of optimal harvest time and yield in bean crops grown for canning. The alcohol-insoluble solids content appeared to be a better reference standard than percentages of seed. Beans more mature than those with 7·2% of alcohol-insoluble solids were unacceptable when canned.

5450. CARDONA A., C., AND MANCINI M., S.
El valor nutritivo del fríjol. (**The nutritive value of beans.**)
Agric. trop. Bogotá, 1960, **16**: 42-55, bibl. 32.

Composition figures are given for green and dried beans, with special reference to protein and amino acids, minerals and vitamins. Varietal differences in composition are noted.

5451. PRIDHAM, J. B., AND SALTMARSH, M. J.
The formation of phenolic glycosides by germinating broad-bean (*Vicia faba*) seeds.
From abstr. in *Biochem. J.*, 1960, **74**(3): 42P, bibl. 5.

When germinated between layers of cotton wool soaked in 1% solutions of di- and tri-hydric phenols.

5452. CORREIA FERNANDES, B. H.
Observações sobre a redução de mitoses em *Vicia faba* L. provocada pelo Co^{60}. (**Observations on the reduction of mitoses in *Vicia faba* induced by Co^{60}.**) [English summary $\frac{1}{3}$ p.]
Rev. agron. Lisboa, 1959, **42**: 57-101, bibl. 38, illus.

Ionizing radiations of 600–1,000 r. from Co^{60} were lethal to the meristematic tissues of broad bean leaves. At intensities of 50–400 r. mitotic activity was delayed, the effect being only slight up to 200 r. In most cases the inhibition was most marked 48 hours after treatment. The return to normal activity took 15 days where the dose was 200 or 250 r. and 20–21·5 days in the other treatments, but there was a second period of inhibition on the 6th day after treatment at 100 and 150 r.

5453. RIEDEL, I. B. M., AND WORT, D. A.
The pollination requirement of the field bean (*Vicia faba*).
Ann. appl. Biol., 1960, **48**: 121-4, bibl. 3.

Many of the flowers on field bean plants fail to produce pods even when fully pollinated. When insect pollination is prevented, pod production on the lowest inflorescences, which normally produce most pods, is reduced, but a compensatory increase on the upper ones ensures a moderate yield. This change in the distribution of pods may be a useful indication of insufficient pollination.—Rothamsted exp. Stat., Harpenden.

5454. KLESSER, P. J.
Virus diseases of broad beans.
Bothalia, 1960, **7**: 283-94, bibl. 32, illus.

Symptoms of 2 viruses on *Vicia faba* and other susceptible species.

5455. GEARD, I. D.
Diseases of broad beans and tick beans.
Tasm. J. Agric., 1960, **31**: 68-73, illus.

Leaf, stem and pod spot (*Ascochyta fabae*), chocolate spot (*Botrytis fabae*), rust (*Uromyces fabae*), wilt and mosaic, manganese toxicity, and their control.

Legumes—peas.

(*See also* 4697, 4716, 4720, 4724, 4726, 4730, 4753, 5322, 5345, 5522, 6311.)

5456. BEGGS, J. P., AND BARRER, P. R.
Crop production: peas.
N.Z. J. Agric., 1960, **100**: 57-70, illus.

Pea growing in New Zealand is described with information on varieties, rotations, fertilizers and plant protection.

5457. NONNECKE, I. L.
The precision of field experiments with vegetable crops as influenced by plot and block size and shape. II. Canning peas.
Canad. J. Plant Sci., 1960, **40**: 396-404, bibl. 5.

In 1957 vine and shelled pea weights of canning peas from an irrigated uniformity trial were recorded to determine the effect on yield variability of various plot and block sizes and shapes. The most uniform reduction in variation occurred in block shapes of 1 plot long and 6 plots wide with each increase in plot length. These results agree with those of other workers, that long narrow blocks are more efficient than square blocks. The optimum plot size was found to be 5 ft. long and 10 ft. wide. [From author's abstract. For part I, see *H.A.*, 30: 114.]—Lethbridge Res. Stat., Alberta.

5458. LAMPRECHT, H.
Zur Vererbung der Samenform bei *Pisum* sowie über zwei neue, diese beeinflussende Gene. (**The inheritance of shape in *Pisum* seeds and two new genes influencing this character.**) [English summary 1 p.]
Agri. hort. genet., 1960, **18**: 1-22, bibl. 15, illus.

One of a series of studies on the genetics of *Pisum* spp.

5459. ATABEKOVA, A. I.
A study of the embryology of peas. [Russian.]
Izv. Timirjazev. sel'sk. Akad., 1960, No. 2, pp. 177-82, bibl. 35, illus.

A brief review of the genetics and cytology of *Pisum sativum*. [See also *H.A.*, 29: 3722b.]

460. Gottschalk, W.
Über züchterisch verwendbare strahleninduzierte Mutanten von *Pisum sativum.* **(Mutants of *Pisum sativum* induced by radiation, which are of use in breeding.)**
Züchter, 1960, **30**: 33-42, bibl. 129, illus.

461. Blixt, S., Ehrenberg, L., and Gelin, O.
Quantitative studies of induced mutations in peas. III. Mutagenic effect of ethyleneimine.
Agri. hort. genet., 1960, **18**: 109-23, bibl. 11, illus.

eed treatment with ethyleneimine produced a uch higher rate of mutation in peas than did -rays.

462. Reynolds, J. D.
Right peas for right conditions.
Fmrs' Wkly, 1960, **52**(18): 107.

he degree of susceptibility to various diseases, ests and herbicides is shown for 24 varieties of eas, 16 grown for harvesting green and 8 for arvesting dry.—Pea Growing Res. Org., Yaxley.

463. Buxton, E. W., Doling, D. A., and Reynolds, J. D.
Additional pea varieties and new selections resistant to fusarium wilt.
Plant Path., 1960, **9**:54-6, bibl. 1, illus.

wenty-three out of 35 varieties tested were resis- ant, and 49% of the progeny of healthy plants elected from 22 susceptible varieties tested in the revious year remained resistant. [See also *H.A.*, 9:3632 and 3722g.]—Rothamsted exp. Stat., .I.A.B. and Pea Growing Res. Org., Yaxley.

464. Hagedorn, D. J.
Two new disease resistant canning peas.
Bull. Wis. agric. Exp. Stat. **539**, 1959, pp. 9, illus.

ew Season and New Wales, resistant to *usarium* spp. and mosaic.

465. Strumpe, Z. I.
A new pea variety in Latvia. [Russian.]
Selekcija i Semenovodstvo, 1959, **24**(3): 64.

he new pea variety Gero-Stendskii proved to be f good quality and yielded 30·9 centners/ha., hich was 6·5% more than the next best variety, orsdag. These 2 varieties possessed similar rotein contents. The yield of haulms of Gero-tendskii was exceptionally high.

466. Woyke, H.
Wpływ terminu siewu na długość okresu sprzętu oraz na wysokość i jakość plonu zielonego grochu. **(The influence of time of sowing on the length of the picking period, and on yields and quality of the green pea crop.)** [English and Russian summaries, ½ p. each.]
Biul. Warzyw., 1959, **4**: 245-55, bibl. 7.

rials with 9 pea varieties showed that short intervals of 6–12 days between sowings retarded the harvesting period by 2–5 days and longer intervals of 2–6 weeks retarded it by 9–16 days. Later sowings produced 20–60% less yield than early sowings, and the peas had a lower sugar content. The dry matter content of peas sown and harvested late increased more rapidly than that of early peas.

5467. King, T. H., and Fields, R. W.
Effect of invasion by storage fungi upon germination of pea seed.
From abstr. in *Phytopathology*, 1959, **49**: 543.

Alaska and Alsweet seeds free of storage moulds and inoculated with *Aspergillus* spp. were stored for 6 months at 85 and 92% R.H. and temperatures of 10, 20 and 30° C. In inoculated seeds germination decreased sharply, whereas in uninoculated seeds it decreased little or not at all. The rate of decrease in germination was dependent upon the species of *Aspergillus* and the temperature and moisture content of the seed.

5468. Vyas, S. R., and Prasad, N.
Investigations on the failure of peas in 'goradu' soils of Gujarat.
Proc. Indian Acad. Sci., Sect. B, 1960, **51**: 242-8, bibl. 3.

Pisum sativum fails to grow on these soils without artificial inoculation of the seed. The high sand content of the soil and consequently the lower thermal death point of the pea rhizobia are the probable causes of failure.—Inst. Agric., Anand.

5469. Kofranek, A. M.
The effect of gibberellins supplied by attapulgite clay on the top growth of pea seedlings.
Reprint from *Proc. kon. ned. Akad. Wetensch., Amsterdam, Ser. C.*, 1959, **62**: 533-41, bibl. 4, illus.

When Petit Breton pea seeds were planted in attapulgite clay on which potassium gibberellate was adsorbed, the plants grew more strongly than untreated plants but also suffered root injury, which reduced the ultimate length of the third internode. The optimum concentration of potassium gibberellate per 180 g. of dry soil probably lies between 1 and 0·1 mg.—Lab. TuinbPl., Wageningen.

5470. Heuver, M.
De invloed van het wegnemen van bloemknoppen op de opbrengst en het duizendkorrelgewicht van erwten. **(The influence of the removal of flower buds on the yield and the thousand-seed weight of peas.)**
[English summary ½ p.]
Tijdschr. PlZiekt., 1960, **66**: 111-19, bibl. 2.

The damage caused by the pea midge, *Contarinia pisi*, was simulated by removing the flowers from one or more nodes of pea plants. Removal of flowers from 1 node decreased the total yield of seed only slightly or not at all, and removal of flowers from 2 nodes decreased seed yields much less than might be expected, considering the number of flowers removed. It was shown that the plants compensated for loss of flowers by an increased number of pods on the untreated nodes, and by producing more and larger seeds per pod.—PlZiekt. Dienst, Wageningen.

5471. Klesser, P. J.
Virus diseases of peas and sweet peas.
Bothalia, 1960, **7**: 253-82, bibl. 19, illus.

Symptoms of 8 viruses on these and other susceptible species.

5472. Devergne, J.-C.
Les virus du pois et du haricot. **(The viruses of peas and french beans.)**
Ann. Soc. nat. Hort. France, 1960, **6**: 12-18, bibl. 20, illus.

A review, covering symptoms and transmission.

5473. Carter, M. V., and Moller, W. J.
Black spot of peas.
J. Agric. S. Aust., 1960, **63**: 353-5, 363, illus.

Mycosphaerella and *Ascochyta* blights may be minimized by sanitation, crop rotation and growing out of season.

5474. Schmidt, T.
Ein Beitrag zur Bekämpfung der Brennfleckenkrankheit der Erbse (*Ascochyta pisi* Lib.). **(On the control of leaf and pod spot in peas.)** [English summary 8 lines.]
PflSch. Ber. Wien, 1960, **24**: 91-7, bibl. 5.

The disinfection of naturally infected pea seed with thiram preparations considerably improved emergence and greatly reduced the incidence of seed-borne primary infection. In a field trial, in which 11 fungicides were tested for their control of secondary shoot infections, much the best results were obtained with preparations of the phaltan group.

5475. Reiling, T. P., King, T. H., and Fields, R. W.
Soil indexing for pea root rot and the effect of root rot on yield.
Phytopathology, 1960, **50**: 287-90, bibl. 4, illus.

A satisfactory method of indexing soils for degree of infection with root rot, caused by *Aphanomyces euteiches* and *Fusarium solani* f. *pisi*, was to take random soil samples from the fields and to grow a susceptible variety of pea in these soil samples in the greenhouse. There was a highly significant correlation between the amount of root rot that developed on the peas in the soil samples and the amount that developed on the peas grown in the fields from which the samples came. It was also found that vine and pod yields decreased as the degree of infection increased, and that early varieties, such as Alaska, were probably more tolerant to root rot than late varieties.—Univ. Minn., St. Paul.

5476. Proctor, J. M.
Two microplot trials with Thimet against pea root eelworm.
Plant Path., 1960, **9**: 72-5, bibl. 3.

Lower final populations of eggs and cysts of *Heterodera göttingiana* were found after peas were grown where Nemagon at 30 lb. active substance per acre had been mixed with the top soil. Thimet at 10 lb. active substance per acre mixed with the top soil suppressed symptoms but permitted population increases. A crop of early-cut vetches, with or without Thimet, caused marked reductions in population.—Pea Growing Res. Org., Yaxley.

5477. Dent, R. G.
Red-legged earth mite and its control.
J. Agric. S. Aust., 1960, **63**: 333, illus.

Control measures against *Halotydeus destructor* on peas and other leguminous crops.

5478. Ministry of Agriculture, London.
Pea, bean and clover leaf weevils.
Adv. Leafl. Minist. Agric. Lond. **61,** revised 1959, pp. 3, illus.

The life histories and control of *Sitona lineatus*, *S. sulcifrons* and *S. hispidulus*.

5479. Lynch, L. J., Mitchell, R. S., and Casimir, D. J.
The chemistry and technology of the preservation of green peas.
Reprint from *Advances in Food Research*, 1959, **9**: 61-151, bibl. 10 pp., illus.

Although mainly concerned with preservation, this review contains information on composition, maturity and its measurement, and the harvesting and handling of peas.—C.S.I.R.O., Homebush, N.S.W.

5480. Woyke, H.
Wartość technologiczna grochu w zależności od średnicy ziarna. **(The processing value of green peas as affected by seed size.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 235-43, bibl. 9.

Results of analyses of the seeds of the varieties Alaska, Edelperle, Delikates and Daisy, which had been harvested 3 times at 2–3 day intervals, showed that quality declines as the period of harvesting is extended. This is because seed dry matter content increases by 1% for each 2–3-day period of picking, while the total sugar content declines by 0·76% and the starch content increases by 1·68%. The results also show that the tenderometer is essential for determining the optimum maturity of peas for processing.

Lettuce and other salad crops.

(*See also* 4672, 4678, 4695, 4697, 4708, 5325, 5336, 5340, 5356, 6174, 6298.)

5481. Groenewegen, J. H.
Stand en betekenis van de veredeling bij sla. **(The present position and importance of lettuce breeding.)** [English summary 14 lines.]
Meded. Dir. Tuinb., 1960, **23**: 295-9, bibl. 5.

A summary of the recent progress that has been made in the improvement of autumn, winter and early spring lettuce varieties in Holland.

5482. Anon.
Four lettuces released.
Agric. Res. Wash., 1960, **8**(9): 16.

Vanguard, Climax, Golden State C and D are tipburn resistant, slow-bolting and of high quality.

5483. Philipp, F.
Ergebnisse der Gemüsesortenversuche 1958, I. **(The results of vegetable variety trials in 1958, Part I.)**
Mitt. Klosterneuburg, Ser. B, 1959, **9**: 10-28.

Varieties of radish and lettuce in Austria.

5484. Huyskes, J. A.
Gebruikswaardeonderzoek van het nieuwe zomersla-ras 'Hilde'. **(An investigation on the value of the new summer lettuce variety Hilde.)** [English summary 17 lines.]
Meded. Dir. Tuinb., 1960, **23**: 232-6, bibl. 1, illus.

Hilde is a Belgian variety produced from a cross between May King and White Boston and introduced in 1947. Nederlandse Hilde is a Dutch selection of this variety. It closely resembles White Boston but is earlier and heavier; it is recommended for trial planting in Holland. In the course of trials on this variety a simple method was developed for determining differences in the yield of such crops as lettuce.

5485. Blumenthal-Goldschmidt, S., and Lang, A.
Presence of gibberellin-like substances in lettuce seed.
Nature, 1960, **186**: 815-16, bibl. 10.

Endogenous growth substances have been found in dry lettuce seeds in quantities greater than in other mature seeds, but below the levels found in immature seeds.—Hebrew Univ., Jerusalem.

5486. van der Post, C. J., and Groenewegen, C. L.
Wortelontwikkeling van sla. **(Root development of lettuce.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1960, **23**: 107-17, bibl. 14, illus.

The root development of lettuces on various soil types was observed during winter by means of glass-sided trenches. Under normal moisture conditions soil aeration and soil temperature were the factors which had most effect on root growth; growth was therefore faster on sandy than on clay soils. A soil temperature of at least 4° C. during part of the day was necessary for any root growth to take place, and at 7–8° C. a growth rate of 10–20 mm. per day was recorded. At levels below the top soil the growth rate of both primary and secondary roots declined rapidly. Only during periods of high transpiration did the regular application of water result in a more superficial root system. During winter the rate of root growth of May King was lower than that of winter varieties such as Regina and Proeftuins Blackpool. The top/root ratio of the latter varieties, however, was higher than that of May King, which suggests that a high rate of photosynthesis is a more important character of a good winter variety than is rapid root growth. Moreover, the deep rooting of Regina enabled this variety to continue growth for a longer time during periods of low temperature.—Inst. Cultuurtech., Wageningen, and R.T.C., The Hague.

5487. Gomi, K.
The effects of variation in the supply of nitrogen, phosphorus, and potassium on the growth of vegetables in sand culture. (Part 3.) Growth of Imperial 847 lettuces (*Lactuca sativa* Linn.) as related to the respective concentrations of nitrogen, phosphorus, and potassium. [Japanese, with English summary ½ p.]
Bull. Fac. Agric. Univ. Miyazaki, 1956, **1**: 201-10, bibl. 51.

The growth of lettuce was favoured by the following concentrations: 80–320 p.p.m. of N (160 p.p.m. being optimal) and 20–80 p.p.m. of both P and K. With increased N in the culture solution the P and K contents in the leaves decreased; increased P was accompanied by decreased leaf N; and increased K by decreased leaf N and P. Optimum leaf contents on a D.M. basis were 3·27% N, 0·61–0·68% P and 3·25–7·80% K. When leaf contents fell below 3·0, 0·6 and 3·0%, respectively, growth was retarded. The N, P, K ratios in the plants, representing absorbed minerals, under favourable conditions were 5·1 : 1 : 6·5 in the N plot, 5·6 : 1: 7·8 in the P plot and 3·6: 1: 4·4 in the K plot.

5488. Katalymov, M. V., and Čurbanov, V. M.
The effect of liming soils and using chlorine-containing fertilizers on the iodine uptake of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1960, **131**: 1191-3, bibl. 3.

Liming of sod-podzolic soils reduced iodine uptake by lettuce plants.

5489. Marrou, J.
La mosaique de la laitue. **(Lettuce mosaic.)**
Ann. Soc. nat. Hort. France, 1960, **6**: 8-11, bibl. 4, illus.

Subjects discussed include varietal characteristics with regard to symptoms in seedlings and adult plants, transmission and control measures.

5490. SCHNATHORST, W. C.
Resistance in lettuce to powdery mildew related to osmotic value.
Phytopathology, 1959, **49**: 562-71, bibl. 31, illus.

For an advance abstract of this work see *H.A.*, 28: 478.

5491. MINISTRY OF AGRICULTURE, LONDON.
Lettuce aphids.
Adv. Leafl. Minist. Agric. Lond. **392,** revised 1959, pp. 6, illus.

Control in the open and under glass.

5492. FRIEDMAN, B. A., AND JAFFE, M. J.
Effect of soft rot bacteria and pectolytic enzymes on electrical conductance of witloof chicory tissue.
Phytopathology, 1960, **50**: 272-4, bibl. 15.

Low-frequency alternating current of 1 kc./second was used to measure the electrical conductance of witloof chicory leaves infected by soft rot bacteria. Inoculation with living cells or culture filtrates of *Erwinia* sp. and *Pseudomonas* sp. resulted in increased tissue conductance. Tissue conductance increased before symptoms developed and ahead of the margin of visible lesions. Tissue injury was the result of the action of pectolytic enzymes produced by the pathogens, for a mutant non-pectolytic strain of *P. marginalis* caused neither soft rot nor conductance changes. [From authors' summary.]—Mkt Path. Lab., U.S. Dep. Agric., N.Y.

Mushrooms.

5493. POPESCU, A.
Cultura ciupercilor la G.A.S. Popești-Leordeni, București. **(Mushroom growing at Popesti-Leordeni State Farm, Bucharest.)** [English, French, German and Russian summaries, $\frac{3}{4}$ p. each.]
Grăd. Via Liv., 1960, No. 2, pp. 10-16 + summaries, illus.

Mushrooms were grown in a compost of FYM, to which 5–6% of gypsum, 2–3% of superphosphate and 8% of sulphate of ammonia were added. The compost was placed in wooden trays in an underground chamber and covered after spawning with a 3 : 1 sand/clay loam mixture sterilized with formalin. Yields varied greatly with temperature, being only 2·2 kg. per sq. m. at 10–17° C. but 11 kg. per sq. m. at 18° C.

5494. CONROY, R. J., AND BLAKE, C. D.
Nematode pests of mushrooms.
Agric. Gaz. N.S.W., 1959, **70**: 644-8, bibl. 7, illus.

See *H.A.*, 30: 3856.

5495. GO, L. K.
Experimental cultivation of *Volvaria volvacea* (Bulliard) Quelet.
Philipp. Agric., 1959, **43**: 446-67, bibl. 11, illus.

Fresh coffee pulp spawn was found to be the best source of this edible fungus, which should be grown on raised beds of fresh, dry rice straw in the shade of bamboos, trees, etc. Sanitary measures are recommended against pests and diseases.

5496. VAN HAUT, H.
Über die Weiterverwendung abgeernteter Champignon-Komposte. (**On the further use of composts after cropping with mushrooms.**)
Z. PflErnähr. Düng., 1959, **85**: 201-14, bibl. 15, illus.

When mushroom cropping has been completed, the residual compost may either be permeated with mycelium or free from mycelium. In either case the compost may cause growth inhibition if applied to another crop unless it is treated. Treatment consists in renewed composting or in spreading the compost and incorporating it into the soil before sowing. Incorporation into the soil should be delayed where compost is permeated with mycelium. The addition of Ca, N and P has proved beneficial.—Zool. Samml. landw. Fak. Bonn und Kohlenstoffbiol. ForschStat., Essen.

5497. TROCMÉ, S.
Enquête sur la composition des fumiers provenant de champignonnières. (**An investigation on the composition of manures from mushroom beds.**) [English, German and Russian summaries $\frac{1}{4}$ p. each.]
Ann. agron., Sér. A, 1959, **10**: 713-24, bibl. 4.

Composition of spent mushroom compost compared with that of F.Y.M.

Okra.

5498. SRINIVASAN, P. M., AND NARAYANASWAMY, P. S.
Experiments on the control of the shoot and fruit borer, *Earias fabia* Stoll and *Earias insulana* Boisd on bhendi, *Abelmoschus esculentus* L.
From abstr. in *Madras agric. J.*, 1960, **47**: 34-5.

Endrin at 0·02% gave the best control and resulted in the highest yield of okra. Of several other insecticides tried dieldrin at 0·1%, aldrin at 0·1% and parathion at 0·025% were as effective as one another and superior to the rest. [See also *H.A.*, 30: 2267.]

Onions and related plants.

(*See also* 4738, 5250, 5328, 5337, 5357, 6308, 6311.)

5499. ANON.
El híbrido de cebolla Granex señala excelentes condiciones. (**The onion hybrid Granex shows high promise.**)
Not. agríc. Serv. Shell Agric., Cagua, 1958, No. 32, pp. 2-3, illus.

The variety Granex gave better results in Venezuela than either of 2 Texas hybrid strains or the established onion varieties Isleña Rosada and Isleña Amarilla, its only disadvantage being the loss of leaves during harvesting and the consequent impossibility of stringing for storage.

5500. KATAYAMA, Y., AND NAGATOMO, T.
Progenies caused by various methods of propagation in *Allium fistulosum* var. *viviparum*. [Japanese, with English summary 1 p.]
Bull. Fac. Agric. Univ. Miyazaki, 1959, **5**: 29-35, bibl. 7.

Welsh onions were compared after continuous propagation in different ways over several years. Those propagated by seed bore many flowers when young during the early years but later became bulbil producers. Those propagated from bulbils were poor flower-bearers in the early years but later resembled plants grown from ordinary bulbs. Wintering ability was also related to the propagation method; the leaves of plants grown from divided stocks died down during the winter, but, in the early years, bulbil-produced plants and seedlings had leaves which survived the winter. Plants bearing many green leaves shot earlier in the spring. An account is also given of segregation after open pollination.

5501. KRICKL, M.
Steckzwiebeln. (**Onion sets.**)
Saatgut-Wirtsch., 1959, **11**: 347-50, bibl. 8.

Selection of onion sets for the absence of bolting is advocated. It is thought that selection from cold-treated bulbs exceeding 3 cm. in diameter would lead to the elimination of bolting within a few generations. Until this has been achieved sets should be stored at 28° C. from October to March, or, better still, for 30 days in October at 30° C. followed by storage at 10° C. until the time of planting. Experimental data are presented.—Höhere Lehr.- u. Versuchsanst. f. Gartenb., Schönbrunn, Vienna.

5502. MAŃCZAK, M.
Wpływ wielkości dymki i temperatury jej przechowania na wybijanie w pędy nasienne i wysokość plonu różnych odmian cebuli. (**The influence of the size of sets and storage temperature on seed stalk development and yields in various onion varieties.**) [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 175-90, bibl. 3.

In trials with 14 onion varieties seed stalk development was greater following storage of sets at 0–4° C. than following storage at −3° C. or at 28° C. (100: 36·8 : 54 respectively). Yields of onions were greater after storage at −3° C. and 28° C. than after storage at 0–4° C.; the increases were greater the larger the sets, but the largest absolute yields were obtained from medium sized bulbs (11–17 mm.) of the varieties Cracovian, Dresdener, Plattrunde and Rawska which had been stored at 28° C.

5503. PATIL, J. A.
Spacing for planting onion bulbs for seed production.
Poona agric. Coll. Mag., 1960, **50**: 213-30, bibl. 3.

The highest seed yields were obtained from bulbs planted 6 in. apart in rows 1 ft. apart. Wider spacing, either in the rows or between the rows, resulted in lower yields. No effect on yield due to method of planting, i.e. on the flat or on ridges, could be detected.

5504. SHEPHERD, L., LAWTON, K., AND DAVIS, J. F.
The effectiveness of various manganese materials in supplying manganese to crops.
Proc. Soil Sci. Soc. Amer., 1960, **24**: 218-21, bibl. 6.

Field and greenhouse studies were carried out over several years, mainly on organic soils, to compare the effectiveness of various Mn carriers and various methods of application, using onions and other plants as test crops. With onions grown in the field Mn produced significant increases in yield over the control in nearly every case, regardless of the Mn carrier and method of application. In one year, when banding and broadcasting were compared, the former produced the greater response.—Mich. agric. Exp. Stat., E. Lansing.

5505. MAKAROV, A. A.
Cytoplasmic pollen sterility of onion. [Russian, with English summary ½ p.]
Izv. Timirjazev. seljsk. Akad., 1960, No. 1, pp. 209-16, bibl. 12, illus.

Differences in morphological and biological characteristics of male-sterile and male-fertile plants described.

5506. PETZER, C. F.
Treat onion seed against wilt disease.
Fmg S. Afr., 1960, **36**(1): 48.

Onion seeds thinly coated with 1 lb. of 50%, or ¾ lb. of 80%, tetramethyl thiuramdisulphate (TMTD) powder for every 20 lb. of seed, gave a yield of about 60,000 plants per lb. of seeds, compared with only 16,000 plants per lb. of untreated seeds.

5507. JACKS, H.
Seed disinfection. XVI. A note on the effects of fungicides on viability of onion seed.
N.Z.J. agric. Res., 1960, **3**: 194-5, bibl. 2.

Fungicides were applied at 25% of seed weight to seeds of the variety Pukekohe Longkeeper after the seeds had been treated with a sticker. Viability tests were carried out immediately after treatment and after 2, 4, 8, 16 months and 2 years of storage. A significant increase in seedling emergence was obtained by treatment with 50% thiram, 2·7% methylmercury oxinate, 4% calomel, 10% quinone oxime benzoylhydrazone, 75% captan, 90% cuprous oxide, 40% hexachlorobenzene and 20% pentachloronitrobenzene. When the seeds were sown in soil inoculated with *Pythium ultimum*, soon after treatment with fungicides, the speed of emergence was increased by treatment with 50% thiram, 4% calomel, 65% zineb and 75% captan.

5508. Stenmark, A.
Ett bekämpningsförsök med lökmal (*Acrolepia assectella* Zell.) **(An experiment on the control of *Acrolepia assectella* on onions.)**
Växtskyddsnotiser, 1959, **23**: 68-70, illus.

In a comparison between DDT, nicotine and parathion the last gave the best control.

5509. Kloft, W.
Wechselwirkungen zwischen pflanzensaugenden Insekten und den von ihnen besogenen Pflanzengeweben. Teil II. **(Interactions between plant sucking insects and the plant tissues on which they feed. II.)** [English summary ¾ p.]
Z. angew. Ent., 1960, **46**: 42-70, bibl. 151, illus.

Largely concerned with *Myzus ascalonicus* on onion.

5510. MacLagan, D. S.
Control of onion fly.
Adv. Leafl. W. Scot. agric. Coll. **77**, 1960, pp. 3.

Cultural measures and dressing seeds with ¼ oz. dieldrin (pure) + ⅛ oz. thiram (50%) per lb. of seeds.

5511. Fajkowska, H.
Badania nad nowymi środkami przeciw śmietce cebulance. **(Studies on new control measures against onion flies.)** [English and Russian summaries ⅓ p. each.]
Biul. Warzyw., 1959, **4**: 425-36, bibl. 19.

Treatment of slightly moistened seeds (50 c.c. water/kg.) with Alvit (dieldrin) at 50 g., Intox 8 (chlordane) at 100 g., or 50% Azotox (DDT) at 200–300 g./kg. gave good control of *Hylemyia antiqua*. Better germination was observed when Alvit was used, but none of the preparations tested damaged the seeds. Intox 8 applied directly to the soil at the rate of 25 kg./ha. before sowing was also effective. When seeds are not treated, 50–70% control can be obtained with (1) a pre-germination spray of crude oil (2 kg./are), (2) an Intox emulsion spray (1: 200) applied at 30 l./are before hatching of larvae, or (3) dusting with Perfectan (DDT + lindane) during egg laying.

5512. Mimaud, J., and Ronzel, G.
Essais de traitement contre la mouche de la carotte et la mouche de l'oignon. **(Trials of treatments against carrot fly and onion fly.)**
Déf. Vég., 1959, **13**(73): 4-9, bibl. 5.

Experiments are described which confirmed the efficacy of lindane and aldrin seed dressings against *Psila rosae* and *Hylemyia antiqua*, the latter as a pest of leeks.

5513. British Columbia Department of Agriculture.
Mechanized onion production.
Bull. B.C. Dep. Agric. **A.E.9**, 1959, pp. 7, illus.

Machines for lifting, windrowing and topping, and notes on storage in bulk boxes.

5514. Simão, S.
Conservação de cebola. **(Onion storage.)**
Rev. Agric. Piracicaba, 1959, **34**: 235-42, bibl. 4.

Trials in which Pera Rio Grande onions were stored under different conditions led to the following conclusions: (1) onions should be harvested when fully mature; (2) sun-curing is preferable to shade-curing; (3) burning the roots did not prolong storage life; (4) treatment with cotton seed oil was injurious; (5) plastic bags induced rotting at normal temperatures and sprouting under refrigeration; (6) onions stored well for 6 months at 5° C. and 85–96% R.H.; they kept well for 15–30 days after removal from cold storage.—Esc. super. Agric. Luiz de Queiroz, Piracicaba.

5515. Herrmann, K.
The flavonoid and other phenolic compounds of *Allium cepa* L. [German ?].
Arch. Pharm. Ber. dtsch. pharm. Ges., 1958, **291**: 238-47, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 23,384.

The dry, brown outer scales of the bulb contain quercetin (4%), spiraeosid (1%), traces of two other glycosides of quercetin, protocatechuic acid (0·45%) and small amounts of phloroglucin and the methyl esters of protocatechuic acid and phloroglucin-carboxylic acid. The brown pigment is probably an oxidation product of protocatechuic acid. It has the properties of a tannin. The fleshy scales contain the same flavonoid compounds and protocatechuic acid, phloroglucin, pyrocatechin and ferulic acid. In the green leaves quercetin, spiraeosid, ferulic acid and small amounts of caffeic acid are present.

5516. Koeppen, B. H.
The isolation and identification of quercetin from yellow-spotted pickled onions.
S. Afr. J. agric. Sci., 1960, **3**: 131-2, bibl. 6.

5517. Mann, L. K., and Stearn, W. T.
Rakkyo or ch'iao t'ou (*Allium chinense* G. Don, syn. *A. bakeri* Regal) a little known vegetable crop.
Econ. Bot., 1960, **14**: 69-83, bibl. 57, illus.

The plants resemble chives, but produce elongated bulbs $\frac{3}{4}$ in. in diameter, which are blanched by earthing up before harvesting. The bulbs are grown mostly in Japan for pickling, and on a very small scale in California and Hawaii.

Rhubarb.

5518. Loughton, A., and Smith, F. G.
Rhubarb spacing experiments.
Exp. Hort., 1960, No. 3, pp. 59-64, bibl. 1.

In each of 3 trials the closest spacing gave the highest marketable yield per acre without loss of quality. Increases in yield were obtained with applications of lime, the original pH of the field being 5·0. Applications of manure or N fertilizer were also beneficial, particularly at the intermediate spacing (30 in. × 36 in.), although at the closest spacing (18 in. × 30 in.) it was evident that shortage of N was not a limiting factor. Spacing at 36 in. × 30 in. with a dressing of 10 cwt./acre of Nitro-Chalk gave the best financial return.—Stockbridge House Exp. Hort. Stat.

5519. Obolensky, G.
Studies in forcing rhubarb. [In English.]
Qual. Plant. Maveg., 1960, **7**: 241-6, bibl. 5.

The results of this project show that the best yields, colour, quality and texture are obtained when rhubarb is grown at temperatures ranging from 55°–60° F. At lower temperatures growth is very slow, and at higher temperatures it is fast, but the texture is poor. If a good red strain of rhubarb is planted, the forced product will be red whatever the temperature, but other strains lose their colour if the temperature is over 60° F. The most vigorous and uniform growth is found in large roots containing ample food reserves. It is important that roots should be subjected to freezing before they are forced.

Root crops.

(*See also* 4663, 4671, 4716, 4738, 5336, 5357, 5379, 5383, 5483, 5512, 5726.)

5520. Buishand, T.
Rond de teelt van vroege kroten. (**The culture of early beet.**) [English and German summaries 1 p. each.]
Meded. Proefst. Groent. Volle Grond Ned. **15**, 1960, pp. 33, illus.

Following a survey of the beet-growing districts and methods of production used in Holland, extensive trials are reported on the performance of many varieties, including Egyptian selections of early beet. On the basis of these trials 5 selections are recommended.

5521. Hintze, S.
Sort- och stamförsök med rödbetor 1955-1957. (**Trials with beetroot varieties and strains 1955-57.**) [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs. Alnarp **128,** 1960, pp. 27.

Among varieties with globe-shaped roots Rubia OJO/51 has given the best yields combined with good quality, though it has a tendency to bolt. The flat-round variety Crosby OE/54 also proved satisfactory.

5522. Barbieri, G.
Effetti della vitamina B_1 e della vitamina B_6 su piante di pisello, fava, bietola e grano. (**Effects of vitamins B_1 and B_6 on pea, broad bean, beet and wheat plants.**) [English summary 6 lines.]
Nuovo G. bot. ital., 1959, **66**: 14-22, bibl. 2, illus.

In pot trials with various media vitamins B_1 and B_6 increased plant height, leaf number and fresh and dry weights. The response was considerable in beets but less in peas and broad beans. For example, in unsterilized garden soil these vitamins at 0·01 mg./l. each increased the leaf number in beet seedlings to 5 compared with 4 in the control. —Ist. Bot., Univ. Firenze.

5523. Anon.
Variedades de hortalizas adaptables a los valles de Aragua. (**Vegetable varieties suitable for the valleys of Aragua [Venezuela].**)
Not. agríc. Serv. Shell Agric., Cagua., 1959, **2**: 45-8, illus.

Carrots, french beans and beetroot.

5524. Palamarčuk, A. S.
The effect on yields of carrot roots of irradiating seeds with radium gamma-rays [Russian].
Selekcija i Semenovodstvo, 1959, **24**(4): 69-70.

When carrot seeds were irradiated with Ra^{226} possessing 99 millicurie activity in doses of 1,000, 500 and 250 r., the responses varied with different varieties and with different conditions. When these carrots were grown in a peat soil, 250 r. gave the best results with the varieties Geranda and Valeria and 1,000 r. with Nantes and Paris. By contrast when they were grown in a mineral soil, the best results were obtained with 250 r. for Valeria and 1,000 r. for Paris carrots, while Geranda and Nantes did not respond to any dose. Increases in yield following treatment ranged from 3 to 15%.

5525. Paszkowska, I., and Szmidt, O.
Doswiadczenia nad reprodukcją nasion marchwi paryskiej z siewu jesiennego. (**Experiments on the production of Paris carrot seeds from autumn sowings.**) [English and Russian summaries $\frac{1}{2}$ p. each.]
Biul. Warzyw., 1959, **4**: 397-405, bibl. 4.

As the storage of roots in trenches was unsatisfactory, early autumn sowing of seeds of the variety Paris was carried out in the field, and the seedlings were covered during the winter with farmyard manure, leaves or peat. The best results were obtained with the leaves. Successful results were also obtained with early autumn sowings in hotbeds, which were covered during the winter, although the seed yields were lower than those obtained in the field.

5526. Castronovo, A., Popovich, M., and Devcic, J.
Método de posible aplicación para producir semilla de zanahoria libre de floración prematura en la región de Buenos Aires. **(A possible method of producing carrot seed that will give non-bolting crops in the Buenos Aires district.]** [English summary ¼ p.]
Rev. Invest. agríc. B. Aires, 1959, **13**: 291-301, bibl. 6.

Seed imported from France gave a lower percentage of bolting plants than that from the U.S.A. or of Argentinian origin. Established local varieties bolted freely, but in newly introduced varieties bolting was inversely related to the coldness of their region of origin. The plan proposed is the production of seed in one of the colder regions of the country and raising progenies from it in the Buenos Aires region for selection, the data from which will be used for further seed production in the cold region. Selection of late-flowering plants in the warmer region did not lead to a reduction of bolting.

5527. Avila, E. A.
Epoca de siembra y periodo vegetativo en zanahoria (*Daucus carota* L.) **(Sowing date and vegetative period in carrots.)** [English summary ½ p.]
Rev. Fac. Agron. B. Aires, 1959, **35**: 1-13, bibl. 11, illus.

Investigations on Chantenay medium long carrots from local and imported seed showed that: (1) plants of both groups from early February–late April sowings flower during the same season; (2) plants from local seed sown between early May and early August flower the next spring; (3) plants of both groups from late August–late January sowings do not reach the flowering stage and die during the winter; (4) plants in the vegetative state arising from early February or later sowings do not die during the following winter; (5) root growth and duration of the vegetative period are correlated, root development being deficient in plants sown in the autumn or winter and satisfactory in those sown in spring and summer; and (6) in general, plants from local seed have greater height, vigour and a longer floral axis than those from imported seed.

5528. Effmert, B.
Über das Natrium als Pflanzennährstoff untersucht an Speisemöhren, Sommerweizen und Ackerbohnen. **(Sodium as a plant nutrient for carrots, summer wheat and field beans.)**
From abstr. in *Kühn-Arch.*, 1959, **73**: 301.

When K was deficient, Na manuring increased the yields of carrot roots considerably, although the growth of the leaves was not affected. Of the Na available in the soil carrots used up to 74%. With Na manuring carrots increased their uptake of K and the translocation of this nutrient from the leaves to the roots. When K was deficient, Na increased the uptake of N and P.—Martin-Luther-Univ., Halle-Wittenberg.

5529. Anon.
Control de hongos y nematodos de la zanahoria. **(The control of fungus diseases and nematodes in carrots.)**
Not. agríc. Serv. Shell Agric., Cagua, 1959, **2**: 29-31, illus.

Alternaria dauci, *A. radicina*, *Cercospora carotae* and *Meloidogyne* spp. in Venezuela.

5530. Suzuki, I., Sugahara, Y., and Todaka, S.
Investigations on vegetable seed treatment. I. Effectiveness of dressing carrot seeds. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1959, **28** : 257-66, bibl. 16, illus.

Results of 4 years' experiments on carrot seeds showed that there was an improvement in carrot stands when the seeds were treated with 0·75% of their weight of thiuram, dichlone or chloranile. The seed treatment was also effective in controlling damping-off caused by *Alternaria radicina*, when naturally infected carrot seeds were sown on steamed soil in a greenhouse. The fungicides checked germination of seeds in petri dishes but showed little or no inhibiting effect on seeds sown in soil. The effectiveness of the treatment varied with degree of infection of the seeds, the seed-bed temperature and depth of sowing.

5531. Condon, P., and Kuć, J.
Isolation of a fungitoxic compound from carrot root tissue inoculated with *Ceratocystis fimbriata*.
Phytopathology, 1960, **50**: 267-70, bibl. 6.

A crystalline compound toxic to *Ceratocystis fimbriata*, a fungus non-pathogenic to carrots, has been isolated from carrot root tissue previously inoculated with this fungus. The presence of this compound in inoculated tissue appears to be largely responsible for the resistance of the carrot to attack by *C. fimbriata*. This compound has been partially characterized with respect to its physical and chemical properties. [Authors' summary.]—Purdue Univ., Lafayette.

5532. Taksdal, G.
Angrep av skjermplantetege (*Lygus campestris* L.) i gulrotfrøfelt fører til nedsett spireprosent og avling. (**A reduction in germination percentage and yield resulting from an attack of *Lygus campestris* L. in a field of carrots grown from seed.**) [English summary ½ p.]
Reprint from *Gartneryrket* 1959, **42**: 709-14, bibl. 8, illus.

It is suggested that the best way of overcoming the pest would be to grow umbelliferous seed crops in plastic greenhouses, since spraying with DDT did not give a satisfactory improvement in germination. This should also facilitate ripening in the short Norwegian summer.

5533. Schuphan, W., and Boek, K.
Histologisch-chemische Untersuchungen in Speicherwurzeln der Möhre (*Daucus carota* L.) in Beziehung zu Rückständen nach Aldrin- und Dieldrin-Behandlung. 1. Mitteilung. (**Histological and chemical studies of carrot tap roots in relation to residues following aldrin and dieldrin treatment. 1st communication.**) [English and French summaries about 25 lines each.]
Qual. Plant. Maveg., 1960, **7**: 213-28, bibl. 11, illus.

It is well known that aldrin and, to a lesser extent, dieldrin will readily dissolve in dipentene. The active dipentene l-limonene is a constituent of carrot essential oils, which may explain why aldrin was found to be soluble in carrot essential oil. The degree of solubility was much higher in essential oil of the variety Bauers Kieler Rote than in that of Nantes carrots. Further investigations are necessary in order to verify the results.—Bundesanst. f. Qualitätsforsch. pflanzl. Erzeugn., Geisenheim/Rhg.

5534. Schuphan, W.
Rückstände von Aldrin und Dieldrin in Wurzeln von Möhren (*Daucus carota* L.) und ihr Einfluss auf den Biologischen Wert. (**Residues of aldrin and dieldrin in carrot roots and their influence on biological value.**) [English summary 19 lines.]
Z. PflKrankh., 1960, **67**: 340-51, bibl. 33.

Three years' data on aldrin and dieldrin residues in the roots of early and late carrot varieties from different areas are presented. The values ranged from 0·05 to > 2 p.p.m., thus sometimes exceeding the U.S. tolerance limits. No correlation was found between the nutritional value of the carrots and their insecticide residues—Bundesanst. Qualitätsforsch. pflanzl. Erzeugn., Geisenheim/Rhg.

5535. Kirkpatrick, M. E., Brogdon, J. L., and DeViney, G. J.
The effect of soil treatments of chlordane or heptachlor on the flavor of turnips, parsnips and carrots.
J. econ. Ent., 1960, **53**: 285-7, bibl. 7.

The flavour of the crops was not adversely affected when they were grown in soil treated with 3 or 6 lb. per acre of heptachlor or with 5, 10 or 20 lb. of chlordane.—Agric. Res. Serv., U.S.D.A.

5536. Kępkowa, A., and Kowalczyk, Z.
Przechowanie kilku odmian marchwi w kopcach różnego typu. (**Storage of several carrot varieties in various types of clamp.**) [English and Russian summaries 1 p. each.]
Biul. Warzyw., 1959, **4**: 277-90, bibl. 8.

All 4 carrot varieties tested kept best in an unventilated pit, in which the carrots were placed in layers with sand, since this type of pit had the smallest temperature fluctuations and the highest CO_2 content during storage. The variety London showed the best keeping qualities in all 3 clamps used and had the lowest dry matter content.

5537. Majlert, W.
Wpływ różnych sposobów kopcowania na wysokość strat przy przechowaniu marchwi. (**The influence of various methods of trench storage on losses in carrots.**) [English and Russian summaries 7 lines each.]
Biul. Warzyw., 1959, **4**: 291-7, bibl. 3.

In trials of 6 methods of storing carrots in trenches the best results were obtained by covering the carrots with sifted sand in unventilated trenches.

5538. Tatebe, T.
Further studies on the inhibiting substance that prevents the self-fertilization of the Japanese radish. I. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1959, **28**: 288-90, bibl. 6.

Experiments on self-sterile radish showed that when the stigma was removed fertilization from cross-pollination was almost as low as that from self-pollination, probably due to mechanical injury caused by the treatment. When pollen grains were introduced into the stigmatic tissues, 80% of selfed fruits were produced, which suggests that the inhibiting action is limited to the surface stigmatic tissues.

5539. Wenham, H. T.
Black rot disease of radishes caused by *Aphanomyces raphani* Kendr.
N.Z. J. agric. Res., 1960, 3: 179-84, bibl. 11, illus.

Life history and symptoms; the variety French Breakfast proved highly resistant.

5540. Peterson, J. L.
Studies on resistance in radish to *Fusarium oxysporum* f. *conglutinans* race 2.
Diss. Abstr., 1960, **20**: 2483-4, being *L.C. Card No. Mic.* 59-5813 of 131 pp.

Work with the resistant variety Early Scarlet Globe indicated that resistance is localized principally in the vascular system and is not due to any morphological barrier inhibiting the growth of the fungus. Resistance was introduced into progeny of the susceptible White Icicle variety.—Univ. Wis.

5541. BECKX, A.
Scorsonères et salsifis. (**Scorzonera and salsify.**)
Courr. hort., 1960, **22**: 148-50, illus.

Notes on varieties, soils, manuring, sowing as annuals or biennials, culture, harvesting, seed storage, pests and diseases.

Spinach.

(*See also* 4686, 4708, 4717, 4771, 5337.)

5542. KOSTECKA, B.
Siew ozimy kilku odmian szpinaku. (**Winter sowing of several spinach varieties.**) [English and Russian summaries $\frac{1}{4}$ p. each.]
Biul. Warzyw., 1959, **4**: 117-23, bibl. 6.

All varieties tested were susceptible to cold damage, the most resistant being Winter Giant. Covering the plants with tomato or potato haulms is the recommended method of protection.

5543. BATOGOWSKA, T., AND HURICH, J.
Badania nad różnymi metodami przykrywania szpinaku ozimego oraz nad zimotrwałością, wrazliwością na długość dnia i stosunkiem płci u 24 odmian szpinaku. (**Studies on various methods of covering winter spinach, and on hardiness, sensitivity to day length and sex relations in 24 varieties of spinach.**) [English and Russian summaries $1\frac{1}{4}$ pp. each.]
Biul. Warzyw., 1959, **4**: 91-107, bibl. 9.

In the severe winter of 1949–50 a covering of tomato haulms gave almost as good protection to spinach as strawy farmyard manure and is recommended as a good substitute. Corn stalks gave some protection, but a nurse crop of mustard was useless. Rheinischer Riesen, Winter Riesen, Tempo and Nobel were the varieties which showed greatest winter hardiness. Of the 24 varieties tested Long Standing Bloomsdale, Lorelei and Juliana produced fewer flower stalks, and at a later stage, than the other varieties. The percentages of male, female and monoecious plants in the different varieties are noted.

5544. MORRISON, T. M., AND CAUGHLEY, J. R.
Fertiliser requirements in an acid peat.
N.Z. J. agric. Res., 1960, **3**: 1-5, bibl. 5.

Spinach plants grown in an acid peat in a glasshouse responded to applications of lime, boron, and copper. The response to copper was not evident until boron was simultaneously added. [Authors' summary.]—D.S.I.R., Wellington.

5545. KAGAWA, A.
Studies on the floral induction of slow bolting spinach. V. Effect of plant growth regulators on floral initiation in spinach. [Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1959, **28**: 277-87, bibl. 62, illus.

The application of maleic hydrazide (50–100 p.p.m.) to young spinach seedlings resulted in the acceleration of floral initiation, bolting and flowering and also in the production of large amounts of seed. NAA (10 p.p.m.) retarded flowering. Gibberellin (1–40 p.p.m.) applied to seedlings in the summer caused elongation of the flower spikes but not floral initiation. When applied in the autumn, however, it caused a remarkable acceleration of floral induction. [For part IV, see *H.A.*, 29: 2543.]

Sweet and red peppers and eggplants.

(*See also* 4749, 6311.)

5546. BOSWELL, V. R., AND OTHERS.
Pepper production, diseases and insect control.
Fmrs' Bull. U.S. Dep. Agric. **2051,** 1959, pp. 33, illus.

Varieties and culture of sweet and hot peppers.

5547. ANGELESCU, H., AND PRECUP, I.
Cultura ardeiului în raionul Sinnicolaul Mare. (**Pepper growing in Sinnicolaul Mare district and its prospects of development.**) [English, French, Russian and German summaries $\frac{2}{3}$ p. each.]
Grăd. Via Liv., 1959, **8**(11): 20-5 + summaries.

Sweet and hot pepper varieties, rotations and fertilizers.

5548. ANON.
Recommendaciones para cultivar pimentones de invierno. (**Recommendations for growing winter crops of sweet peppers.**)
Not. agríc. Serv. Shell Agric., Cagua, 1958, No. 31, pp. 3-4, illus.

In Venezuela; with particular reference to disease control.

5549. OBERMAYER, E., AND OTHERS.
A magyar fűszerpaprika-nemesítés és vetőmagtermesztés egyes módszertani kérdései és eredményei. (**Methodological problems and results in the breeding and seed production of Hungarian red pepper.**) [Russian and German summaries $1\frac{1}{2}$ pp. each.]
Kísérl. Közlem., Sect. C, 1959, **52C**(1): 3-23, bibl. 12.

A review of work and description of methods used.

5550. Dempsey, A. H.
Inheritance studies of certain fruit and plant characters in *Capsicum frutescens*.
Diss. Abstr., 1960, **20**: 2506-7, bibl. 1, being *L.C. Card No. Mic.* 59-5372 of 74 pp.

The characters investigated were plant height and stem diameter; fruit length, width, shape and fruit wall thickness; pungency, fruit position and resistance to bacterial spot (*Xanthomonas vesicatoria.*) It was found that types resistant to bacterial spot were readily developed from crosses between susceptible and resistant peppers.—Ohio St. Univ.

5551. Windham, S. L.
Tests indicate best varieties of bell pepper.
Miss. Fm Res., 1959, **22**(11): 7.

For heavier upland soils Keystone Resistant Giant, Yolo Wonder B and Oakview Wonder; on bottom soils Early Calwonder and Ferry's California Wonder.

5552. Rudzińska, M.
Wpływy odmiany oraz różnych sposobów produkcji rozsady na wczesność i wysokość plonu papryki. (**The influence of variety and of various methods of raising plants on maturity and yields of peppers.**) [English and Russian summaries 1½ pp. each.]
Biul. Warzyw., 1959, **4**: 207-22, bibl. 9.

Four capsicum varieties were subjected to (a) a shortened day length of 12 hours during the 1–4-leaf stages, (b) treating seeds with temperature changes of −2° C. to +22° C. every 12 hours for 10 days before sowing, and (c) additional overhead fertilization with 18% superphosphate at the rate of 0·5 g. per pot. Results showed that all these treatments accelerated blossoming and fruit formation and increased total yields of all 4 varieties. The yields of sweet varieties were very similar to one another and very high quality fruit were obtained from field-grown crops. Higher yields were obtained from crops grown in hotbeds than from those grown in the open, and the varieties World Beater and California Wonder made large, well-formed plants under glass. Lednicka and Kalnikov also cropped well in hotbeds. The capsicin content of the semi-sharp varieties was low. No differences were found in the vitamin C content of the sweet varieties grown in the field or under glass, although considerable differences in the vitamin C content were noted at various stages of maturity.

5553. Lengel, P. A.
Development of the pollen and the embryo sac in *Capsicum frutescens* L. var. Japanese Variegated Ornamental.
Ohio J. Sci., 1960, **60**: 8-12, bibl. 3, illus.

Special features noted are the monosporic development of the embryo sac and division of the generative nucleus in the pollen tube.

5554. Benedek, L.
A fűszerpaprika utóérleléséről. (**After-ripening of red peppers.**) [English and Russian summaries 1 p. each.]
Kísérl. Közlem., Sect. C, 1959, **52C**(1): 69-85, bibl. 6, illus.

In hot red peppers harvested red-ripe the total carotenoid content of the pericarp increased by 120% before reaching its maximum 5-6 weeks after harvest, whereas in sweet red peppers the increase was only 65% attained 3-4 weeks after harvest. The hot varieties showed a drop in sugar content during after-ripening, losing 32% in 7-8 weeks, and the sweet varieties lost 25% sugar in 5-6 weeks. The sweet peppers dried more rapidly than the hot ones, but the rate of drying was also dependent on weather conditions. Peppers harvested before the red-ripe stage and then after-ripened had thinner pericarps, less colouring matter and provitamin A, but more ash and sugars, than those picked at the red-ripe stage.

5555. Anon.
Variedades de berenjenas recomendables. (**Recommended varieties of eggplant.**)
Not agríc. Serv. Shell Agríc., Cagua, 1959, **2**: 3-4, illus.

The eggplant varieties Black Beauty, Florida High Bush and Fort Myers Market, which have a growth cycle of 4 months, are recommended for the Aragua valleys of Venezuela.

5556. Reyes, J. C.
A serious disease of eggplant caused by mites in the plant breeding garden of the Institute of Agriculture.
Araneta J. Agric., 1959, **6**: 137-43, bibl. 7, illus.

Control of the unidentified mites was obtained with several insecticides, of which Folidol M-50 was the best. A 2–3% soap solution was also effective.

Tomatoes—general.

(*See also* 4807, 6280, 6301, 6314, 6330.)

5557. van der Does, J.
Uitkomsten van de teelt van vroege stooktomaten in Berkel. (**Cropping results obtained with early tomatoes in heated glasshouses in the Berkel district of Holland.**) [English summary ⅓ p.]
Meded. Dir. Tuinb., 1960, **23**: 218-23, illus.

An analysis of the effects of changing cultural practices and economic factors on yields and profits during the period 1948-59.

5558. de Vries, K. J.
Moderne kassen bij de vroege stooktomatenteelt. (**Modern heated glasshouses for early tomatoes.**) [English summary 13 lines.]
Meded. Dir. Tuinb., 1960, **23**: 249-55, bibl. 4, illus.

The economics of early tomato production are compared in zinc-plated steel glasshouses with a roof-span of 6·4 m. and a roof angle of 30° and in improved Venlo dutch-light glasshouses, made of wood, with a roof span of 3·2 m. and a roof angle of 21°. In the former, more modern type of house higher and earlier yields were obtained, with the result that returns were greater. The nett profits were greater per sq. m. of house and per man-hour of labour, and were not less per unit of invested capital, than in the Venlo houses.—[See also *H.A.*, 29: 3686.]—Inst. Tuinbouwtech., Wageningen.

5559. COLLINS, N. R., MUELLER, W. F., AND BIRCH, E. M.
Grower-processor integration.
Bull. Calif. agric. Exp. Stat. **768,** 1959, pp. 77, bibl. in text.

An economic study of relationships, and the factors which affect them, between tomato growers and canners in California.

Tomatoes—breeding and varieties.

(*See also* 5345, 5619, 6318.)

5560. CHOUDHURY, B.
Hybridisation between *Lycopersicon esculentum* Mill. and *Lycopersicon peruvianum* Mill.
Indian J. Hort., 1959, **16**: 102-7, bibl. 22.

5561. MILINKÓ, I.
Dohánymozaik — vírus ellenállóságra—nemesítés kilátásai paradicsomnál. (**Prospects in breeding for resistance to tobacco mosaic virus in tomatoes.**) [English and Russian summaries 1 p. each.]
Kisérl. Közlem., Sect. C, 1958 (issued 1959), **51C**(3): 85-93, bibl. 26.

Using tolerant lines crossed with *Lycopersicum hirsutum* and *L. peruvianum.*

5562. KEMP, G. A., AND NONNECKE, I. L.
Differences in intensity of unripe fruit colour in the tomato.
Canad. J. Plant Sci., 1960, **40**: 306-9, bibl. 7.

Differences in the intensity and pattern of the mature-green fruit colour of 5 tomato varieties and their hybrids were evaluated visually and with a colour reflectant-meter (Photovolt). The differences were greater than could be explained on the basis of the two known non-allelic genes. The results suggest the existence of either an allele for one of these genes or more likely, a third gene that influences the intensity of green fruit colour in the tomato. [From authors' abstract.]—Lethbridge, Res. Stat. Alberta.

5563. SHILLING, P. R.
Investigation of the hereditary character, woolly, in the tomato.
Diss. Abstr., 1960, **20**: 2474-5, bibl. 2, being *L.C. Card No. Mic.* 59-5366 of 52 pp.

See *H.A.*, 30: 2315.

5564. SCHILOWA, I., AND MERFERT, W.
Ein Beitrag zum Problem der vegetativen Hybridisation von Tomaten. (**A contribution to the problem of vegetative hybridization in tomatoes.**)
Züchter, 1960, **30**: 73-7, bibl. 8.

Tomato scions and their fruits (F_0) did not show any noticeable changes after grafting. The influence of early maturing rootstocks on the seed progeny of late maturing scions (F_1 and F_2) proved to be in one direction only. The occurrence of plants with red fruits in the F_2 progeny of the yellow-fruited scion variety Goldene Königin grafted on the red-fruited Frühe Liebe may well have been due to the influence of the rootstock. With regard to leaf shape no influence of the rootstock was observed on the progeny of the scions (F_1 and F_2). The F_1 progeny of the scion Goldene Königin grafted on Frühe Liebe showed signs of genuine hybrid vigour.—Inst. PflZücht., Bernburg/Saale.

5565. ORPHANIDES, J. P.
Results of the tomato variety trial carried out in 1958.
Countryman, Nicosia, March-April 1960, pp. 9-10, 18.

The variety Pearson (both the American strain and the Greek improved strain) gave the highest yields and was resistant to blossom end rot but was rather late in ripening. The varieties commonly grown in Cyprus were among the first dozen in yield and also in early ripening, but they were susceptible to blossom end rot.

5566. KOVACS, A.
Nuovi ceppi di pomodoro resistenti alle malattie. (**New disease-resistant strains of tomato.**)
Frutticoltura, 1960, **22**: 178-9, illus.

The new hybrids Peasson VF 6 and Peasson VF 11 have shown high resistance to infection by *Verticillium* [*albo-atrum*] and *Fusarium* spp., and Red Top V 9 is resistant to *Verticillium* wilt.—Ist. Pat. veg., Univ. Bologna.

5567. WRÓBLEWSKA, Z.
Kolekcja pomidorów zakładu warzywnictwa w Puławach lata 1954-1956. (**The tomato collection of the Vegetable Production Division in Puławy in 1954-1956.**) [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 17-25, bibl. 3.

The results of variety trials with 8 stiff-stemmed, 17 determinate and 58 indeterminate varieties of outdoor tomato are tabulated and discussed. Pulawski Dwarf and Sztambowyj Alpatiewa were the highest yielding varieties of the stiff-stemmed group, Industrial Pulawski the best of the determinate group and Earliest of All and No. 10 gave highest yields in the indeterminate group. Dry matter contents are given for the fruit of all the varieties, including the Bulgarian variety Plovdivskaja Konservá which showed the very high value of 7·32%.

5568. Pohoska, I.
Porównanie wartości gospodarczej różnych odmian pomidorów szklarniowych. **(Evaluation of various hothouse tomato varieties.)** [English and Russian summaries $\frac{2}{3}$ p. each.]
Biul. Warzyw., 1959, **4**: 345-53, bibl. 3.

Export Wonder (F_1) was the best, economically, of 16 varieties studied.

5569. Porte, W. S.
Nationwide poll of popular tomato varieties.
Amer. Veg. Gr, 1960, **8**(4): 12-13, illus.

This survey includes a useful table giving, state by state, the principal processing varieties, the principal fresh market varieties and promising new varieties. The most frequently mentioned varieties are: for processing, Rutgers; for fresh use, Rutgers and Moreton Hybrid; as new varieties, Moreton Hybrid and Glamour. The varieties most commonly used for the commercial greenhouse crop are probably Ohio WR7 and Michigan-Ohio Hybrid.—U.S.D.A., Beltsville. Md.

5570. Campbell, J. A.
Tomato study seeks best vine ripened variety.
Miss. Fm Res., 1959, **22**(11): 1, 8, illus.

Although the best croppers, Bigboy Hybrid and Kokomo, gave similar yields of No. 1 grade fruit, the former produced almost twice as much No. 2 grade in addition, though with 5% more fruit showing stem crack.—Truck Crops Branch Exp. Stat., Crystal Springs.

5571. Pollack, B. L.
New hybrids can aid stake-tomato growers.
Science for the Farmer, 1959-60, **7**(3): 14.

Outstanding strains included Glamour, Penna 103 [see also *H.A.*, 29: 2549] and Moreton, the last two being F_1 hybrids.

5572. Lambeth, V. N.
The Mosage tomato.
Res. Bull. Mo. agric. Exp. Stat. **681**, 1958, pp. 7, illus.

A high yielding, large fruited, vigorous variety, resistant to *Fusarium*.

5573. Lambeth, V. N.
The Mozark tomato.
Res. Bull. Mo. agric. Exp. Stat., **680**, 1958, pp. 8, illus.

This early maturing variety, which is resistant to *Fusarium* wilt but susceptible to *Alternaria*, has consistently outyielded Rutgers, especially in dry summers. A hybrid Mozark × Sioux was most impressive in the latest (1957) trials.

Tomatoes—propagation, planting and pruning.

5574. Campbell, J. A.
Test pots for tomato plants.
Miss. Fm Res., 1960, **23**(1): 7.

Tomato plants grown and transplanted to the field in 3-in. peat pots produced significantly greater early and total yields than bare-root plants. Early yields from the pot plants were also significantly greater than from plants taken to the field with a ball of earth round their roots.

5575. Maskery, D. C.
Tomato grafting gives increased yields.
Grower, 1960, **54**: 180-1, illus.

Seeds of a Dutch hybrid tomato resistant to root rot will be available for distribution in Britain this autumn. The hybrid is not suitable for commercial fruit production, but when used as a rootstock for commercial varieties it has given very good results. It is now known as rootstock "K". The plants should be grafted when 3 in. tall and their stems $\frac{3}{16}$ in. thick, the upper part of the rootstock being cut off leaving 1 or 2 leaves and the two seedlings joined by approach grafting. Taking care to keep both root systems intact, the grafted plants are potted and then planted out in the normal way.

5576. Cooper, A. J.
The effects of plant form and planting density on glasshouse tomato cropping.
J. hort. Sci., 1960, **35**: 103-9, bibl. 9, illus.

At wide spacing (6 ft. × 6 ft.) the retention of axillary shoots in the Potentate variety of glasshouse tomato increased yield per plant, number of fruits borne and percentage of uniformly coloured fruits, but it decreased mean fruit weight. At closer spacings the retention of axillary shoots decreased yield per unit area and number of fruits borne, but it increased mean fruit weight and percentage of uniformly coloured fruits. There was a tendency for yield per unit area of single-stemmed plants to increase with increased closeness of planting up to 252 sq. in. per plant, but above 450 sq. in. per plant marked increases in yield per unit area were not obtained. [Author's summary. See also *H.A.*, 29: 2558 and 30: 2329.]—Glasshouse Crops Res. Inst., Littlehampton.

5577. Pohoska, I.
Wpływ rozstawy pomidorów uprawianych w gruncie szklarni na wczesność i wysokość plonu. **(The influence of spacing on yield and maturity of hothouse tomatoes.)** [English and Russian summaries $\frac{1}{2}$ p. each.]
Biul. Warzyw., 1959, **4**: 339-44, bibl. 5.

Planting in bands 70–50–50–70 × 35 cm. was compared with spacing at 70 × 35 cm. Band planting increased yield per sq. m. of glass but slightly decreased yield per plant. The closer spacing also gave slightly higher early and total yields of marketable fruit.

5578. Dębska, I., and Kozlowska, E.
Różne metody cięcia pomidorów gruntowych. **(Various methods of pruning tomatoes.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 109-15, bibl. 4.

Methods of pruning tested were: (1) single stems—all laterals removed; (2) double stems—the main stem with the lateral below the first cluster retained; (3) single stem with all laterals retained and pinched out above the first cluster; and (4) single stem with all laterals retained, the clusters and tips, however, being removed from all laterals. Treatment 3, with the largest number of clusters, produced the highest yield of marketable fruit.

5579. Woyke, H., and Szczypiorska, J.
Wpływ cięcia i palikowania na zawartość suchej masy i skład chemiczny pomidorów. **(The influence of pruning and training to stakes on the dry matter and chemical composition of tomatoes.)** [English and Russian summaries ¾ p. each.]
Biul. Warzyw., 1959, **4**: 257-70, bibl. 14.

Results of trials with the varieties Earliest of All and Immun showed that total yields increased with limited pruning but early yields decreased. Yields of fruit for processing were higher from plants trained to stakes than those from untrained plants. The dry matter content, individual and total sugars and acids decreased with increased pruning but were higher in plants trained to stakes.

5580. Pudelski, T.
Wpływ różnych sposobów cięcia pomidorów szklarniowych na wysokość i wczesność plonu. **(The influence of various methods of pruning hothouse tomatoes on yield and maturity.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 355-62, bibl. 6.

In trials of 4 different methods of pruning hothouse tomatoes the highest yields of early, good quality tomatoes were obtained from single stem plants, pinched out above the 7th cluster with lateral shoots removed immediately on appearance. Increasing the assimilative leaf surface by retaining lateral shoots reduced early and total yields. Double-stemmed plants, whilst giving the highest total yield, also gave the lowest early yield and smaller economic returns than single stemmed plants.

Tomatoes—illumination, irrigation and mulching.

(*See also* 5325, 6327.)

5581. Wellensiek, S. J., and others.
Aanvullende belichting van tomaten. **(Supplementary illumination of tomatoes.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1960, **23**: 20-32, illus.

A series of experiments carried out over 2 years showed that the harvest date of November-sown tomatoes can be advanced by 2–3 days by providing supplementary illumination from sowing until the time of planting. Various types of lamp were compared, and costs and returns were analysed. Further research is needed to determine exactly how far the practice is economically justified.

5582. Skierkowski, J.
Wpływ uzupełniającego naświetlania rozsady pomidorów szklarniowych światłem jarzeniowym na wcsesność i wysokość plonów. **(The influence of supplementary illumination of hothouse tomato plants with fluorescent light on earliness and yields.)** [English and Russian summaries 1 p. each.]
Biul. Warzyw., 1959, **4**: 363-81, bibl. 4.

In 2 years' trials supplementary illumination (4,000–5,000 lux) of Potentate tomato seedlings from germination until transplanting (62–69 days) for 8 hours during the night advanced the date of the early crop by 19 or 20 days and increased both early and total yields. Supplementary illumination following pricking out from boxes to pots advanced the date of the early crop by 10–15 days and also increased early and total yields. The best results were obtained using artificial daylight, and similar increases in yield were obtained whether the supplementary light was applied immediately before or after natural daylight or in the middle of the night. Side lighting resulted in greater stem growth than lighting from above, but there was no significant difference in yield.

5583. Dunn, S., and Went, F. W.
Influence of fluorescent light quality on growth and photosynthesis of tomato.
Lloydia, 1959, **22**: 302-24, bibl. 17.

Tomato seedlings about 10 cm. tall were subjected to artificial light for 16 hours daily in an air-conditioned chamber at 17° C., using 6 different light intensities from about 600 to 1,800 ft.-c. The fluorescent lamps, used separately and in various combinations, with and without 5% of supplementary incandescent light, were blue, green, "gold", pink, red and 5 types of white. The effects on dry weight, fresh weight and stem elongation were measured after 6 days. In every case increased light intensity led to increased dry matter production up to a point at which other factors became limiting. Mixed fluorescent and incandescent lighting was more effective than fluorescent lighting alone in promoting dry matter formation in plant tops. Of the commercially available fluorescent lamps the "warm white" was the most effective, green and red were both low in effectiveness, and blue and pink were intermediate, but all were surpassed by the high-intensity red lamps still in the experimental phase. On the basis of dry matter production per unit of luminosity (i.e. per lumen) the red and blue lamps were the most efficient, the yellow and green being feeble in comparison. The spectral emission (microwatts per lumen) of the blue and red lamps separately, and particularly in combination, was positively correlated with dry weight increase. On the basis of dry matter production per unit (milliwatt) of power the two most effective lamp types were "warm white" and "gold". All the above data refer to tops. Production of dry matter in roots was most active under "gold", pink and blue lamps. Stem elongation was greatest under yellow light, and was markedly increased by the addition of incandescent light. Succulence was increased by red, and decreased by blue, light.—Univ. N.H., Durham.

5584. GUNAR, I. I., KASPŠIK, M., AND KRASTINA, E. E.
Reaction of tomato plants to the interruption of the dark and light periods at different times of the day. [Russian, with English summary 10 lines.]
Izv. Timirjazev seljsk. Akad., 1960, No. 1, pp. 89-102, bibl. 22.

Flowering and fruiting were delayed by 2-hour interruptions of either the dark or the light period. The maximum delay occurred when the interruption came in the middle of either of these periods. Interruption of the dark period had the greater effect.

5585. BOYCE, W. R.
Comparison of trickle irrigation and measured bucket watering of glasshouse tomatoes.
N.Z. J. agric. Res., 1960, **3**: 87-105, bibl. 8.

In trials conducted for 3 seasons there were no differences in the yield of ripe fruit obtained at any stage of picking between plants grown under trickle irrigation and those grown with bucket watering. The amounts of water supplied in both cases were similar. Differences in concentrations of liquid fertilizer did not affect yield, but higher concentrations tended to reduce the incidence of blotchy ripening.—Hort. Res. Stat., Levin.

5586. KUREK, M.
Przyczynek do badań nad wpływem wilgotności gleby na plon pomidorów i zawartość suchej masy w owocach. (**A contribution to studies on the influence of soil moisture on the yield and dry matter content of tomatoes.**) [English and Russian summaries ¾ p. each.]
Biul. Warzyw., 1959, **4**: 155-65, bibl. 22.

The effect of 2 levels of soil moisture, 60% and 30% of field capacity for an alluvial soil and 50% and 25% of field capacity for a podsol, was investigated. On both soils the higher moisture levels resulted in greater total yields and a larger proportion of first grade fruit. Abundant watering produced more and larger fruits with a lower dry matter content, but total dry matter yields were smaller on the drier soils.

5587. (AUTRY-HALL, F.)
Plastic mulch increased tomato yields by about 30 per cent.
Banana Bull., 1960, **23**(1): 6.

Two grades, 0·0015 and 0·002 in. thick, of 3-ft.-wide polythene sheeting were used. Both withstood growing conditions satisfactorily, but as neither could be lifted without damage at the end of the season the thinner type was the more economical. The only perforations were 1½ in. holes for the plants set 2 ft. apart, the rows being 5 ft. apart. A basic fertilizer was added prior to laying of the sheeting, and 2 side dressings were later applied between the sheets. [See also *H.A.*, 29: 3704.]

Tomatoes—soils and nutrition.

(*See also* 4678, 4682, 5335, 5340, 5343, 5605, 5616, 5617, 5623, 6297, 6298, 6308, 6310.)

5588. FLOCKER, W. J., TIMM, H., AND VOMOCIL, J. A.
Effect of soil compaction on tomato and potato yields.
Agron. J., 1960, **52**: 345-8, bibl. 8, illus.

Tomato yields were not significantly reduced by heavy compaction caused by harvesting equipment. —Univ. Calif., Davis.

5589. VAN DOREN, D. M., JR.
Relationship between oxygen diffusion rates, as measured with the platinum microelectrode, and plant growth.
Diss. Abstr., 1960, **20**: 2481, being *L.C. Card No. Mic.* 59-5958 of 76 pp.

In a field experiment tomato and other plants were subjected to various degrees of oxygen stress over most of the growing period. Tomato plants grown in plots in which the diffusion rates were below a certain "critical" rate in the early part of the growing period generally produced less growth and fruit than plants grown in plots having diffusion rates greater than the "critical" rate for tomatoes. The possibility of relating the rate of change of oxygen diffusion rates following rainfall or irrigation to eventual crop yield is discussed. Existing data on plant growth in relation to "critical" oxygen diffusion rates are summarized.—Mich. St. Univ.

5590. DOYLE, J. J., AND HAMLYN, F. G.
Effects of different cropping systems and of a soil conditioner (VAMA) on some soil physical properties and on growth of tomatoes.
Canad. J. Soil Sci., 1960, **40**: 89-98, bibl. 16.

Yields of greenhouse tomatoes grown on soil which had been continuously cropped with potatoes were lower than those grown on a continuous grass soil, but were increased by the addition of VAMA, which increased the percentage of water stable aggregates and total pore space.—Canada Dep. Agric., Fredericton, N.B.

5591. KOPANICA, A. M.
Influence of organo-mineral mixtures on yields of vegetables and potatoes. [Russian.]
Agrobiologija, 1960, No. 1, pp. 99-102.

Tomatoes receiving 5 tons/ha. of humus or 10 kg./ha. of NPK (active ingredients) in the planting holes yielded more fruit than unfertilized controls. Mixing the humus and NPK fertilizers gave a greater increase in yield than the combined increases resulting from separate applications. Humus plus NPK fertilizers also gave large increases in cabbage yields.

5592. MATZNER, F.
Ergebnisse eines Felddüngungsversuches mit Buschtomaten. **(Results of a manurial field trial with bush tomatoes.)** [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1960, **8**: 167-76, bibl. 6.

The importance of P for tomatoes was shown by comparisons between plants receiving P-deficient and complete fertilizers. The difference in financial returns between NPK-sulphate and NPK-chloride amounted to 2,126 DM. per hectare in favour of the sulphate. Mulching with peat increased both tomato yields and the proportion of grade 1 fruit. Soil analysis is recommended as a guide to nutrient requirements in intensive vegetable growing.—Inst. Acker- u. PflBau, Friedrich-Schiller Univ., Jena.

5593. PROCTER, G. C.
A simple feeding programme for tomatoes.
Grower, 1960, **53**: 1115-17.

In a fresh tomato soil a pre-planting application of 14 lb. N, 20 lb. P_2O_5 and 40 lb. K_2O per 1,000 plants is recommended. Assuming that half of the N and K_2O and one-fifth of the P_2O_5 in the above will be taken up by the plant, the balance to be provided by subsequent feeds will be 18 lb. N, 6 lb. P_2O_5 and 40 lb. K_2O. These amounts represent approximately 140 lb. of "Solufeed" High Potash soluble powder (a 16 : 5·5 : 28 mixture), which should be dissolved at 1½ lb. to 1 gal. and used at a dilution of 1 in 100. A watering and feeding programme for the season is given. Feeding should start when the first fruits set and nutrient solution and plain water should be applied alternately. If feeding is excessive and the pC falls below 3, yields decline. A vigorous plant with large, fleshy leaves, pale green unripe fruit and blotchy ripe fruit requires extra food. When the leaves become small and dark and the unripe fruit is dark green, feeding should be reduced or temporarily stopped.—Plant Protection Ltd., Fernhurst.

5594. LUCAS, R. E., WITTWER, S. H., AND TEUBNER, F. G.
Maintaining high soil nutrient levels for greenhouse tomatoes without excess salt accumulation.
Proc. Soil Sci. Soc. Amer., 1960, **24**: 214-18, bibl. 11, illus.

Experimental and commercial plantings received supplemental fertilizers in the form of monopotassium (KH_2PO_4) and diammonium ($(NH_4)_2HPO_4$) phosphates and potassium (KNO_3) and ammonium (NH_4NO_3) nitrates. A total of 2,922 lb. N, 3,054 lb. P_2O_5, and 4,662 lb. K_2O was applied per acre during 2 growing seasons. At the end of the second season 10 lb. nitrate-N, 188 lb. P and 402 lb. K per acre were recorded in the soil; the soluble salt reading for a 1 : 2 soil/water mixture was 28×10^{-5} mho. Yields of up to 100 tons of fruit per acre were harvested resulting in total crop removal of 350, 105 and 580 lb. per acre of N, P and K, respectively. Frequent additions of N, P and K were required during growth, but provided the fertilizers did not contain chlorides or sulphates there was no danger of excess accumulation of soluble salts. Levels of K greater than 500 lb. per acre frequently induced Mg deficiency. A practical fertilizer programme based on the above results would require a pre-planting application of 100 tons of manure and 1,500 lb. of 0–20–20 plus about one half of the amount of supplemental fertilizer used above.—Mich. agric. Exp. Stat., East Lansing.

5595. GÖHLER, F.
Die Konzentration von Nährlösungen für den erdelosen Anbau der Tomate unter Glas. **(The concentration of nutrient solutions for the soilless culture of tomatoes under glass.)** [Russian and English summaries 11 and 9 lines.]
Arch. Gartenb., 1960, **8**: 130-45, bibl. 5, illus.

In two years' experiments young tomato plants up to the completion of the second truss responded best to a 4‰ nutrient solution. Cropping plants, on the other hand, produced the highest yields with 1–2‰ solutions, higher concentrations causing damage. The plant contents of N, K_2O, P_2O_5 and MgO increased with rising concentrations of the nutrient solution, while the CaO content decreased, but the proportion of the nutrients utilized by the plants decreased with rising concentrations of the solution.—Inst. Gemüseb. Grossbeeren, Humboldt Univ., Berlin.

5596. PUDELSKI, T.
Wstępne badania nad wpływem nawożenia dolistnego na wysokość i jakość plonu pomidorów gruntowych. **(Preliminary tests of the influence of foliar nutrition on yield and quality of tomatoes.** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 71-9, bibl. 8.

The chemical composition of tomatoes could be influenced by foliar sprays applied shortly before ripening. P fertilization exerted the greatest influence on yield and dry matter content of the fruit. Foliar-applied N had an adverse effect on plant health.

5597. MAMBER-RYLSKA, I.
Wpływ nawożenia azotem i potasem na transpiracje pomidorów. **(The influence of nitrogen and potassium fertilization on transpiration of tomatoes.)** [English and Russian summaries ½ p. each.]
Biul. Warzyw., 1959, **4**: 81-9, bibl. 16.

Increases in plant size and fruit yields were obtained with N and K fertilization of potted plants. Additional N decreased the dry matter content of the fruit but K increased it. The earliest fruiting was achieved with the lowest levels of N. Water uptake per unit of dry matter was lower in plants with a relatively high N content.

5598. CLAY, D. W. T., AND HUDSON, J. P.
Effects of high levels of potassium and magnesium sulphates on tomatoes.
J. hort. Sci., 1960, **35**: 85-97, bibl. 22, illus.

Two experiments are described in which tomatoes were grown in brick-walled plots in a glasshouse, under moist water-regimes, but in soils brought to different levels of salinity by watering before planting with solutions containing various amounts of a 3 : 1 mixture of K and Mg sulphates. In 1956 four treatments giving a wide range of salinity levels indicated that growth and yield of tomato plants were depressed when the electrical conductivity of 1 : 2·5 (wt. : wt.) soil : water suspensions of soil samples rose above 1,300 micromhos per cm., that is, when the pC value fell below about 2·9. In 1957 similar salinity treatments were used, with similar effects on growth and yield, but, in addition, gypsum was added to half the plots at the rate of 10 tons per acre. The addition of gypsum did not significantly affect the yield of tomatoes. Blossom-end rot was prevalent in soils at high salinity levels. Blotchy ripening was much more prevalent in the variety Potentate than in Ailsa Craig but was reduced as salinity increased. The highest yields of best quality fruit were produced at moderate levels of salinity. [Authors' summary.]—Univ. Nott. Sch. Agric., Sutton Bonington.

5599. NIELSEN, B. F.
Tørstofudbytte og naeringsstofoptagelse i tomat ved magnesiumtilførsel. **(Dry matter yield and nutrient uptake of tomatoes supplied with magnesium.)** [English summary 1 p.]
Tidsskr. Planteavl, 1960, **63**: 884-97, bibl. 18.

Tomato plants growing in Mg-deficient soil at Lyngby were treated with various amounts of magnesium sulphate applied as sprays or to the soil. An increasing supply of Mg sulphate to the soil (0, 500 and 1,000 kg./ha.) resulted in increasing contents of dry matter, although the content of Mg expressed as a percentage of the dry matter of the fruits decreased initially and then increased. The yield curve representing these results was sigmoid. The plants used relatively large amounts of N, K and Ca. N and K were particularly high in the fruits, whereas Ca was particularly high in the vegetative parts of the plant. Mg, when applied to the soil or by spraying, greatly increased the demand for, and utilization of, the other nutrients.

5600. SOLOV'EV, V. A.
On salt resistance in individual plants and formative processes in tomatoes. [Russian.]
Fiziol. Rast., 1960, **7**: 222-5, bibl. 11, illus.

When tomato plants were grown in pots with 0·2% sodium sulphate or sodium chloride, those receiving Na_2SO_4 grew normally, whereas the others either died, grew normally at a reduced rate or showed morphological abnormalities in both vegetative and reproductive organs. The changes in the fruit were similar to those caused by 2, 4-D or 2, 4, 5-T, i.e. total or partial parthenocarpy and distorted fruits.

5601. ABUTALYBOV, M., AND MARDANOV, E. E.
The effect of microelements in nutrient pots on the development of tomato plants. [Azerbajdžan, with Russian summary.]
Uč. Zap. Azerb. Un-t., 1957, No. 8, pp. 65-73, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,005.

Mn, Cu and Zn in the form of sulphates and B as borax were added to the mixture used for making nutrient pots. The microelements improved seedling growth and increased the dry matter content of the plants. B and Mn advanced flowering, whereas Cu slightly retarded it. The average weight of the fruits and the content of sugars and vitamin C increased and that of organic acids decreased. The most effective elements were Mn and B.

Tomatoes—growth and physiology.

(*See also* 4702, 4703, 4714, 4716, 4725, 4771, 5131.)

5602. YU, S.-A.
The effects of radiation on Chatham tomato seeds.
Diss. Abstr., 1960, **20**: 3013, being *L.C. Card No. Mic.* 59-3436 of 109 pp.

The percentage of germination of tomato seeds irradiated with various amounts of X-rays and thermal neutrons was normal, but there was a great reduction in seedling survival as the dosage increased. A dose of 50,000 r of X-rays was lethal for all germinating seedlings and one of $1·0 \times 10^{14}$ of thermal neutrons approached the lethal treatment. The same types of abnormality were induced by both types of irradiation and included morphological and chlorophyll changes and partial or complete sterility. Ten inheritable and many non-inheritable mutations were caused. Improved mutations included early blight resistance and earlier ripening.—Univ. N.H.

5603. Golińska-Noszczyńska, K.
Żywotność pyłku różnych odmian pomidorów w różnych porach roku. **(The vitality of pollen of various tomato varieties in different seasons.)** [English and Russian summaries ¼ p. each.]
Biul. Warzyw., 1959, **4**: 299-304, bibl. 4, illus.
Studies of 18 varieties showed considerable differences in the diameter of their pollen grains. Staining with Belling's reagent showed that the vitality of the pollen of different varieties fluctuated greatly over the year, being lowest from December to February and highest in the summer months.

5604. van Die, J.
Studies on the role of sugars and α-ketoglutarate in the formation and secretion of amino acids by bleeding tomato root systems.
Reprint from *Proc. kon. ned. Akad. Wetensch. Ser. C.*, 1960, **63**: 230-8, bibl. 17.
Experiments indicated that most amino acids in the root sap are derived from α-ketoglutarate, but a shortage of N salts or of α-ketoglutarate probably leads to an increase in the proportion of protein-derived amino acids in the xylem exudate. [For earlier work see *H.A.*, 30: 3926.]—Plant Physiol. Res. Centre, Wageningen.

5605. Tsui, C., and Wu, C. M.
The effect of zinc on the synthesis of tryptophane from indole and serine in the tomato plant. [In English.]
Science Record, China, 1960, **4**: 54-7, bibl. 9.
Indole and serine were infiltrated into the leaf tissues of normal and Zn-deficient tomato plants growing in culture solution. The tryptophane content was 4 times greater in the normal than in the Zn-deficient plants; the content of the Zn-deficient plants was also lower than that of normal plants before any deficiency symptoms appeared, and it decreased gradually as the deficiency became more pronounced. The capacity of the Zn-deficient plants to synthesize tryptophane remained low even when serine and indole were infiltrated into the tissue; and the simultaneous infiltration of Zn, serine and indole also had little effect. When Zn was supplied to the Zn-deficient plants via the culture solution, growth was resumed and the capacity to synthesize tryptophane increased. [For earlier work see *H.A.*, 18: 1906].—Peking Inst. Plant Physiol.

5606. Kępkowa, A.
Efektywność kilku różnych związków chemicznych i preparatów zastosowanych do hormonizowania pomidorów szklarniowych i wczesnych gruntowych. **(A comparison of the effectiveness of several chemical compounds and preparations used as hormone sprays on hothouse and early field tomatoes.)** [English and Russian summaries 1½ pp. each.]
Biul. Warzyw., 1959, **4**: 305-26, bibl. 9.
Tests carried out using β-naphthoxyacetic acid (0·005%), the K salt of α-naphthylacetic acid (0·005%), 2,4,5-trichlorophenoxyacetic acid (0·001%), Betoxon (0·5%) and Frutofix (0·05%) showed that the use of hormone sprays had only a slight effect on the total yield of tomatoes but considerably increased early yields of both hothouse and field crops. The percentage of small fruit was slightly reduced by hormone treatment, but the percentages of deformed and diseased fruit were not affected. The addition of Pagin (0·5 ml./litre), a wetting agent, considerably increased the effectiveness of β-naphthoxyacetic acid. The highest early yield increases were obtained in both hothouse and field tomatoes with Betoxon and α-NAA. A high early yield of hothouse tomatoes was also obtained with 2, 4, 5-T, but the fruit was deformed.

5607. Emery, G.
Biological effects of a chemical mutagen, diepoxybutane, on tomato.
Science, 1960, **131**: 1732-3, bibl. 3.
Treatment of tomato seeds with 0·2, 0·5 or 0·8% of 1:2, 3:4-diepoxybutane caused mutations at all doses. The highest concentration caused delayed germination, chlorophyll-deficiency sectoring in the first true leaves and failure to bear fruit.—Pa St. Univ., University Park.

5608. Soost, R. K.
Effects of gibberellic acid on genetic characters in two tomato lines.
Bot. Gaz., 1959, **121**: 114-18, bibl. 11, illus.
Gibberellic acid applied in amounts of 30 and 60 µg. per plant to the 4th expanding leaf of tomato plants of a genetic dwarf variety and of a normal variety produced significant increases in stem elongation in both varieties. The 30-µg. treatment produced a relatively greater response in the normal variety than in the dwarf variety. The increase in plant height was mainly produced by elongation of nodes below the point of application. Flowering was hastened by the increase in rate of stem growth and not by a change in position of the inflorescence. A reduction in the number of leaflets per leaf and a change to entire rather than serrate leaflets occurred in all treated plants. The gibberellin applications produced leaves and initiated indeterminate growth on the genetically non-leafy, determinate inflorescences. This action indicates a possible anti-inhibitory role for gibberellin. [From author's summary.]—Univ. Calif., Riverside.

5609. Butcher, D. N., and Street, H. E.
The effects of gibberellins on the growth of excised tomato roots.
J. exp. Bot., 1960, **11**: 206-16, bibl. 19.
Both GA and NAA reduced main axis growth at high, and enhanced it at low, sucrose concentrations. GA and NAA both increased the number of laterals

per root, especially at relatively low sucrose concentrations.—Univ. Coll., Swansea.

5610. Rappaport, L.
Effect of temperature and gibberellin on the growth of tomato fruits.
Naturwissenschaften, 1960, **47**: 285, bibl. 12.

Temperature had a pronounced effect on the enlargement of fruits from flowers treated with GA. GA had no significant effect on fruit weight or diameter either at the coolest (11° C.) or warmest (23° C.) night temperatures, but it strikingly reduced fruit size at an optimal temperature (17° C.).—Univ. Calif., Davis.

5611. Hughes, E. W. D., and Street, H. E.
Effects of inhibitory concentrations of 3-indolylacetic acid and 3-indolylacetonitrile on cell division and tissue differentiation in excised tomato roots.
J. exp. Bot., 1960, **11**: 198-205, bibl. 17.

For earlier work see *H.A.*, 24: 3921.

5612. Kiermayer, O.
Zur Beeinflussung der morphoregulatorischen Wirksamkeit von 2, 3, 5-Trijodbenzoesäure (TIBA) durch α-Naphthylessigsäure. **(The influence of α-naphthaleneacetic acid on the morphological effects induced by 2, 3, 5-triiodobenzoic acid (TIBA).)**
Physiol. Plant., 1959, **12**: 841-53, bibl. 22, illus.

In tomatoes TIBA produced various morphological effects, whereas NAA in higher concentrations produced no morphological effects, although it strongly retarded growth. The application of NAA and TIBA combined weakened or completely prevented ring fasciation, flower formation, the formation of lateral shoots and morphological changes in the leaves. A possible synergistic effect of the TIBA/NAA mixture on leaf morphology was found.—Biol. Forsch Abteil., Österreichische Stickstoffwerke, Linz/Donau.

5613. Stanton, D. J.
Treatment of tomato seedlings with n-m-tolylphthalamic acid.
A.R. Cawthron Inst., 1958-59, 1959, pp. 32-4.

Dilutions of 100 and 200 p.p.m. were used in glasshouse and outdoor trials. The treatment increased the number of flowers on the plant, but there was no proportionate increase in fruit setting or any effect on yield.

5614. Thurman, D. A., and Street, H. E.
The auxin activity extractable from excised tomato roots by cold 80 per cent. methanol.
J. exp. Bot., 1960, **11**: 188-97, bibl. 20.

Tomatoes—disorders, diseases and pests.

(*See also* 4749, 5188, 5423, 5565, 5566, 5575, 5598, 5634, 6297, 6319.)

5615. Rich, S., and Taylor, G. S.
Antiozonants to protect plants from ozone damage.
Science, 1960, **132**: 150-1, bibl. 4.

Manganous 1, 2-naphthoquinone-2-oxime protected tomato foliage in the field from damage apparently caused by excessive atmospheric ozone. The compound proved to be a very effective antiozonant. The similar cobaltous and manganous chelates of 8-quinolinol were also effective antiozonants. The materials were applied to cloth of the type used to make field tents for shade-grown tobacco. Tomato plants covered with cloth treated with cobaltous 8-quinolinolate were protected against otherwise damaging concentrations of ozone. These materials and methods may afford a useful way to reduce weather fleck of tobacco and other plant injuries caused by excessive atmospheric ozone. [Author's abstract].

5616. Butters, R. E.
The pC value of soils and its effect on the tomato crop.
J. Sci. Food Agric., 1960, **11**: 202-12, bibl. 11.

Blotchy ripening of tomatoes can be reduced without loss of yield on soils that contain little or no gypsum, if the pC [specific conductivity] of the 1: 2½ soil: water ratio saturation extract is maintained between 3·0 and 3·2. In conditions of excessive transpiration plants on drier soil show an increase in blotchy ripening, whereas those with added salts and moister soil are much less affected. On soils where gypsum levels are high, use of the saturation extract to determine the salt concentration shows a good correlation with plant growth, whereas the 1: 2½ extract is unsatisfactory. Gypsum has little, if any, effect on plant growth, even when added to the soil in a quantity sufficient to saturate the 1: 2½ extract. In the extract gypsum gives a low pC reading, but its effect in the soil solution is small. [For related work see *H.A.*, 26: 3836].—Plant Protection Ltd., Fernhurst.

5617. Kidson, E. B.
Water-culture experiments on nutritional problems of the tomato.
A.R. Cawthron Inst., 1958-59, 1959, pp. 29-31.

Examination of fruit affected with cloud (blotchy ripening) showed that the area in contact with the stem or other fruit was most often affected, but covering exposed areas with patches did not reproduce the disorder. Raising the osmotic pressure of the nutrient solution reduced the incidence of cloud [see also *H.A.*, 29: 3697], and when sodium sulphate was added to the solution for this purpose there was a considerable reduction of Ca and K in the leaves and more than a 10-fold rise in Na. Cloud susceptibility is also thought to be related to a low starch content in immature fruit. High polyphenol oxidase activity associated with cloud tissue appears to be a strong reaction in response to some abnormal condition or breakdown. The variety Grosse Lisse was much less susceptible to cloud than Potentate.

5618. Gilbert, J. C.
Vascular browning of tomato fruits disappears in windy weather.
Hawaii Fm Sci., 1960, **8**(3): 4-5, illus.

Observations made on a succession of crops of tomato varieties susceptible to vascular browning showed that this disorder ceased to appear as soon as steady trade winds started to blow, day and night, after mid-January. This happened despite the occurrence of cloudy, wet and cool spells of weather during the windy period. This suggests the possibility that the disorder may result from sub-oxidation injury in the affected tissues during periods of little air movement.

5619. Murakishi, H. H.
Varietal response to factors influencing the expression of tomato internal browning symptoms.
From abstr. in *Phytopathology*, 1959, **49**: 546.

The internal browning (IB) reaction of 4 varieties exposed to low and high light, with and without Boyle's strain of TMV, was determined in the greenhouse. In the low-light-no-TMV series plants of Homestead had 26% IB at first harvest, but TMV plants had twice the IB of comparable uninoculated plants. Under high light TMV induced 48% IB compared with 4·0% for uninoculated plants. In Fireball, under high light and no TMV, 10% of the fruit had IB, but no IB occurred under low light. Infection with TMV at low and at high light caused 26% and 37% IB, respectively. Two other varieties, Indian River and Holmes's P.I.23567, remained free of IB under all 4 conditions of the test. No apparent differences could be detected in IB induced by low light or TMV infection.

5620. Braithwaite, B. M., and Blake, C. D.
Tomato pest and disease control 1960-1961. Programme for N. Coast.
Banana Bull., 1960, 23(4): 7.

Seed treatment, seed-bed and field fumigation and spraying.

5621. Sinclair, J. B.
Reduction of tobacco mosaic virus on tomato seed by fermentation.
From abstr. in *Phytopathology*, 1959, **49**: 551.

Seed separated from the pulp and fermented for 10 days showed a highly significant reduction in TMV concentration compared with unfermented seed.

5622. Ministry of Agriculture, London.
Tomato spotted wilt.
Adv. Leafl. Minist. Agric. Lond. **238**, revised 1959, pp. 6, illus.

Symptoms, other host plants, and preventive measures.

5623. Nayudu, M. V., and Walker, J. C.
Bacterial spot of tomato as influenced by temperature and by age and nutrition of the host.
Phytopathology, 1960, **50**: 360-4, bibl. 15.

Tomato plants showed marked differences in susceptibility to bacterial spot due to *Xanthomonas vesicatoria* on ageing; the older the leaves, the lower the susceptibility. The disease developed most rapidly at a constant temperature of 24° C. Night temperatures of 24 and 28° C. were the next most favourable, regardless of day temperatures. In plants supplied with various amounts of N the disease index was highest at 50 p.p.m. and declined steadily with increases in N, the difference becoming significant at 400, 800 and 1,600 p.p.m. With P the disease indices were high and very close to one another in the range of 16 to 512 p.p.m.; those at 4 and 1,024 were significantly lower. With various K levels the disease indices were not consistently different between 12·5 and 800 p.p.m.; at 1,600 the index was markedly reduced. Disease suppression at extremely high levels of N, P and K appeared to be partly due to the high osmotic value of the nutrient, since balanced solutions at similar osmotic values gave similar reductions in the disease index. [See also *H.A.*, 30: 2360.]—Univ. Wis., Madison.

5624. Doepel, R. F.
Black spot of tomatoes.
J. Agric. W. Aust., 1960, **1**: 383-5, illus.

Alternaria solani; symptoms and control measures.

5625. Ministry of Agriculture, London.
Potato and tomato blight.
Adv. Leafl. Minist. Agric. Lond. **271,** revised 1959, pp. 9, illus.

For tomato blight control dusting with copper fungicides at 10-day intervals, starting when the first fruit are set, is recommended.

5626. N.S.W. Department of Agriculture, Biological Branch.
Septoria spot of tomatoes.
Agric. Gaz. N.S.W., 1960, **71**: 41, illus.

Symptoms and control measures.

5627. Couch, H. B., and Bloom, J. R.
Influence of soil moisture stresses on the development of the root knot nematode.
Phytopathology, 1960, **50**: 319-21, bibl. 13, illus.

There was a significantly higher number of knots, caused by *Meloidogyne hapla*, on tomato roots grown in soil at field capacity than on roots grown at the permanent wilting percentage. Growing the plants at field capacity after an initial period of 30 days at the permanent wilting percentage did not significantly increase the number of knots on the roots. It is concluded that the eggs of *M. hapla* hatch equally well at both levels of soil moisture stress, but that the hatched nematodes are unable to migrate at the higher level.—Pa St. Univ., University Park.

5628. LOEWENBERG, J. R., SULLIVAN, T., AND SCHUSTER, M. L.
Gall induction by *Meloidogyne incognita incognita* by surface feeding and factors affecting the behavior pattern of the second-stage larvae.
Phytopathology, 1960, **50**: 322-3, bibl. 7, illus.

In experiments with tomato and mustard plants it was shown that the presence of sucrose or cellobiose in the growing medium promoted the movement of the nematode larvae to the host root. It was also found that gall formation frequently started as a result of the nematodes feeding on the surface of the root and before they had entered the root.—Univ. Neb., Lincoln.

5629. WHITCOMB, W. H.
Sweet corn as a trap crop to protect early tomatoes from tomato fruitworm.
Ark. Fm Res., 1960, **9**(1): 10.

Eight varieties of corn with different maturity dates were planted around the perimeter of a square containing 20–25 fields of tomatoes. Infestation was recorded at different points in the tomato fields close to the corn and in fields situated more than ½ mile from the corn. The results showed substantially lower rates of infestation in the tomato fields near the corn than in fields situated further away.

5630. SRINIVASAN, P. M.
Control of fruit borer (*Heliothis armigera* H.) on tomato.
Indian J. Hort., 1959, **16**: 187-9, bibl. 5.

Sprays of 0·1% DDT and 0·02% endrin were more effective than 0·025% parathion. Removing infested fruits by hand gave no control.

5631. ANON.
El combate del gusano del jojoto en tomates. (**The control of corn earworms in tomatoes.**)
Not. agric. Serv. Shell Agric., Cagua, 1959, **2**: 6-7, illus.

Heliothis obsoleta was controlled in Venezuela with endrin and with DDT with or without aldrin.

5632. BRAITHWAITE, B. M.
Tomato mite control.
Banana Bull., 1960, **23**(1): 7.

With DDT or sulphur.

Tomatoes—fruit handling and composition.

(*See also* 4936, 5356, 6308.)

5633. ZAHARA, M., MACGILLIVRAY, J. H., AND CLEMENTE, L. J.
Forklift loading of canning tomatoes.
Veg. Crops Ser. Univ. Calif., Davis, **96**, 1959, pp. 12, illus.

The methods compared were hand loading of cannery tomatoes, forklift loading of cannery tomatoes, forklift loading of greenwrap tomatoes, and the use of low trailers. Compared with hand loading, savings of 17–39 cents per ton were obtained with mechanical handling, trailer operation giving the greatest saving and forklift loading from the end of the truck the least.

5634. AKAMINE, E. K., AND SHOJI, K.
Tolerance of tomatoes to methyl bromide fumigation.
Tech. Progr. Rep. Hawaii agric. Exp. Stat. **124**, 1960, pp. 7, bibl. 2.

Fumigation tests, mainly for the control of the oriental fruit fly, are described. Sound tomatoes can tolerate 3½ hours' exposure to methyl bromide at 2 lb. per 1,000 cu. ft. at 70° F. Only sound fruit should be used. The varieties Kauai, Lanai and Big Boy were the most tolerant.

5635. MEIGH, D. F., AND OTHERS.
Ethylene production by tomato and apple fruits.
Nature, 1960, **186**: 902-3, bibl. 5.

A flame ionization detector for gas chromatography is described, which was used to determine the evolution of ethylene by whole fruit, fruit segments, tissue slices, homogenates, mitochondria, microsomes and supernatant fractions from apple and tomato fruits. Results from these studies indicated that the evolution of ethylene by tomatoes is greatly stimulated by cutting the fruit into segments and tissue slices. On the other hand, ethylene evolution by apples was not greatly changed by this treatment. Maceration of the tissues caused a very considerable decline in ethylene evolution in both apple and tomato fruits. The mitochondria and microsomes isolated from these homogenates evolved a negligible amount of ethylene.—Ditton Lab., Larkfield, Kent.

5636. SARKAR, S. R.
Ascorbic acid content of tomato and tree tomato in Darjeeling area.
Sci. and Cult., 1960, **25**: 530-1, bibl. 2.

No relationship was found between the vitamin C content of the fruit and the elevation at which the plants were grown. The tree tomatoes (*Cyphomandra betacea*), however, showed higher values than those obtained in South India.—Publ. Hlth Lab., Darjeeling.

Sundry crops.

5637. Minamikawa, K., Nishizawa, T., and Saito, H.
Studies on the edible East Indian lotus, *Nelumbo nucifera* Gaertn. II. On the control of the rhizome rot of lotus. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1959, **28**: 241-56, bibl. 39, illus.

Results of field experiments showed that the 3 types of rot, caused by *Fusarium* spp., a *Pythium* sp. and a mixed infection of *Fusarium* and *Pythium*, were transmitted through seed rhizomes, water, and diseased leaves and rhizomes ploughed into the soil. The brown rot disease caused by *Fusarium* was most prevalent in paddy fields with shallow irrigation, but the purple rot caused by *Pythium* occurred most often in lotus beds with deep water. High soil and water temperatures also favoured the disease. Keeping the field filled with water during the winter was an effective control measure for brown rot, and soil applications of calcium cyanamide, lime-sulphur or wettable captan during the period from soil preparation to early May also controlled the disease. The Shina-shu variety was most resistant to brown rot, but no differences in susceptibility to *Pythium* were noted.

5638. Desnoy, A.
Le stachys—un légume-racine à ne pas sousestimer. **(Stachys [Chinese artichoke]—a root vegetable that should not be despised.)**
Courr. hort., 1960, **22**: 91-2, illus.

Brief notes on soil requirements, manuring, planting, earthing up and harvesting *Stachys affinis*.

TOBACCO

General.

(*See also* 4639, 5300, 6082, 6083, 6280, 6301, 6313, 6328.)

5639. Wanrooy, G. L.
Tobacco growing and rural welfare. I and II.
Neth. J. agric. Sci., 1960, **7**: 283-308, bibl. 13, illus., and **8**: 103-23.

Two articles intended for people concerned with rural welfare. The first deals in outline with growing, curing and systems of production. The second is intended as a guide for the improvement of tobacco growing and deals at greater length with seed-bed and field management, selection and breeding. A list of recommended books, bulletins and periodicals is appended.

5640. Anon.
Les tabacs bulgares. **(Bulgarian tobaccos.)**
Rev. int. Tabacs, 1959, **34**: 181-3, 203-5.

Soils and types in the 4 main growing areas.

5641. Anon.
Le tabac au Cambodge. **(Tobacco in Cambodia.)**
Rev. int. Tabacs, 1960, **35**: 15.

Soils, area, yields, types and varieties.

5642. Jekiel, N. T.
Le monopole iranien des tabacs. **(The Iranian tobacco monopoly.)**
Rev. int. Tabacs, 1959, **34**: 201.

Types and varieties (cigarette, pipe and narguileh), location and production.

5643. Basso, M. A.
La culture du tabac en Uruguay. **(Tobacco growing in Uruguay.)**
Rev. int. Tabacs, 1959, **34**: 99-103, 107.

Culture, harvesting and processing of air-cured, dark tobaccos of different types including Chileno and Rio Grande.

5644. Felbier, H.
Zugkraftbedarf im Tabakbau. **(Tractor power requirements in tobacco production.)**
Dtsch. Tabakb., 1959, **39**: 217-19, illus., from *Tob. Abstr.*, 1960, **4**, Abstr. 271.

Net tractor time requirements for 1 growing season, using a 12 h.p. tractor, amounted to 119 hr./ha.

Breeding and varieties.

See also 6329.)

5645. Sikka, L. C., and Batra, B. M.
Studies on commercial feasibility of artificially produced hybrid vigour in tobacco (*N. rustica.*) 1. Heterosis in F_1.
Indian Tobacco, 1960, **10**: 43-53, bibl. 19, illus.

Hybrids from inter-varietal crosses showed heterosis, not only in total yield but in other associated characters, including resistance to unfavourable climatic conditions. In the best F_1 crops the increase in yield of dried, cured leaf was 720 lb. per acre.—Tob. Sub-Stat., Ferozepore, Punjab.

5646. Bolsunov, I.
Die gegenwärtige Situation in Anbau und in der Züchtung von Burley-Tabaken in Europa und Aussichten für die Zukunft. **(The present position with regard to the cultivation and breeding of burley tobacco varieties in Europe and their future prospects.)**
Unitab, 1960, No. 14, pp. 11-15, illus., and in French pp. 16-21.

5647. Psareva, E. N., and Matveenko, T. M.
The resistance of certain tobacco varieties to black root rot. [Russian].
Tabak, 1960, **21**(1): 21-3, bibl. 8.

Of 21 tobacco varieties tested for resistance to black root rot (*Thielaviopsis basicola*) the Soviet variety Molovata 2613, the Bulgarian Džebel

Sekirka and Rila 9, the Romanian Molovata and the Yugoslav Amerikan and Hercegovina received the highest ratings. Possible reasons for the susceptibility in Russia of varieties found resistant elsewhere, are briefly discussed, and the importance of testing introduced material is stressed.

5648. GRAHAM, T. W.

A tobacco first.

Agric. Res. Wash., 1960, **8**(8): 15.

PD 611, a tobacco line resistant to root-knot nematodes, has been developed in South Carolina and will be used as a parent in producing commercial varieties resistant to this nematode. It lacks resistance to black shank, bacterial wilt and fusarium wilt but has acceptable nicotine and sugar levels, flavour and aroma.

5649. OGDEN, W. B.

Improved binder tobacco.

Agric. Res. Wash., 1960, **8**(11): 16.

Havana 501, a new variety with combined resistance to wildfire, mosaic and black root rot.

5650. MOORE, E. L., POWELL, N. T., AND GWYNN, R.

Better yields with NC 75, new tobacco variety.

Res. and Fmg, N.C., 1959, **18**(2): 6.

ANON.

Disease-resistant tobacco.

Agric. Res. Wash., 1960, **8**(9): 16.

The new flue-cured variety NC 75 is highly resistant to black root rot, moderately resistant to black shank and fusarium wilt, less injured by brown spot than some leading commercial varieties and shows some resistance to Granville wilt.

5651. MANN, T. J., MATZINGER, D. F., AND WEYBREW, J. A.

Nicotine and sugar contents of Mammoth flue-cured tobacco varieties.

Agron. J., 1960, **52**: 350-2, bibl. 6.

Nicotine contents of the leaves from the last 4 harvests of 8 back-crossed Mammoth selections were much lower than those of leaves from comparable stalk positions on standard varieties. The low nicotine content may be due to competition for N as a result of prolonged vegetative growth. No marked dilution of reducing sugars was found in the cured leaves of the Mammoth selections. N.C. St. Coll., Raleigh.

Seeds and seed-beds.

(*See also* 5299, 6331.)

5652. ENDEMANN, W.

Der Einfluss der Ernte und Trocknung auf die Qualität des Tabaksamens. (**The influence of harvesting and drying on the quality of tobacco seed.**) [Russian and English summaries ½ p. each.]

Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 211-20.

In the late ripening varieties examined different methods of harvesting and drying had very little influence on the weight and germination of seeds, provided these were collected when completely ripe. Seeds gathered during the period of "milk-juice" ripeness, together with the capsules and upper stems, and dried at 30–35° C. generally weighed less but germinated as well as fully-ripened seeds. A suitable method of harvesting and drying late ripening seeds is described.

5653. ALEGRE VILLANUEVA, J. V.

Extraction and bromatological-industrial study of the oil of tobacco seeds.

Bioquim. An. Univ. nac. Mayor San Marcos de Lima, 1957, **8**: 438-43, from *Tob. Abstr.*, 1960, **4**, Abstr. 187.

Composition and physical characteristics of Peruvian tobacco seed oil.

5654. VAN VUUREN, P. J. J.

Polyphenols in tobacco seed. [Afrikaans and French summaries ⅓ p. each.]

S. Afr. J. agric. Sci., 1960, **3**: 15-21, bibl. 9.

Scopoletin, scopolin, rutin and chlorogenic acid found in very small quantities in Jamaica Wrapper tobacco seed.

5655. SANDULESCO, R.

Vernalization of the tobacco variety Ia lomitza [Romanian.]

Industria alimentara, Prod. veg., 1959, **12**: 336-70, from *CORESTA Inf. Bull.*, 1960, No. 1, Abstr. 3,429.

This variety can be vernalized at 20° C., the treatment taking from 10–15 days. Seed moisture during vernalization should be 45%. Plants from vernalized seeds were earlier, their yield was 43% higher and their quality was improved by 4%.

5656. GAYREL, P.

Étude sur l'activité uricolytique de quelques angiospermes. Evolution au cours des stades de croissance de *Nicotiana tabacum* var. Paraguay. (**A study of the uricolytic activity of some angiosperms. Development in relation to the stages of growth of *Nicotiana tabacum* var. Paraguay**.]

C.R. Acad. Sci., Paris, 1959, **249**: 2104-5, from *CORESTA Inf. Bull.*, 1960, No. 1, Abstr. 3,354.

In the first 2 days of culture the uricolytic activity of seeds, either dry or steeped, was very slight; from the third day onwards uricase activity increased steadily, coincidental with the appearance of the leaves of the seedling.

5657. VINCENT, L.

Essais comparatifs de désinfection des semis de tabac. (**Comparative studies on the disinfection of tobacco seed-beds.**) [In French and German.]

Unitab, 1960, No. 14, pp. 22-7, illus., and in German pp. 27-32.

A mobile sterilizer for the sterilization by steam of tobacco seed-bed soil is described and illustrated. The equipment was used in several plantations for several years, and the results obtained were encouraging both culturally and economically, especially in France where soil fumigants are expensive. Of the fumigants tested Vapam had the best all-round effect on germination, nematodes, weeds, insect pests and fungi.—Centre d'Études tech. agric., La Réole.

5658. MOUNAT, A., AND HITIER, H.
Essais de désinfection chimique des sols pour semis de tabac. (**Trials on the chemical disinfection of tobacco seed-beds.**) [English summary 13 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 287-98.

In a trial with Paraguay P.48 and White Burley in 1959 Vapam and allyl alcohol were applied at 100 and 200 c.c. per 5 l. water and methyl bromide at 50 g. per sq.m. 10 and 20 days before early, normal and late sowing. At 200 c.c. Vapam was effective both as a herbicide and a fungicide, but it delayed germination in 2 out of 3 cases when applied only 10 days before sowing. Allyl alcohol was slightly superior to Vapam as a herbicide at both rates but was not a good fungicide; it could safely be applied at a slightly shorter interval before sowing than could Vapam. Methyl bromide was effective both as a herbicide and a fungicide, but was less convenient to apply. None of the chemicals was better or more economical than steam sterilization.

5659. ROSA, M., AND MICKOWSKI, J.
Ulteriori prove sull'effetto fungicida ed erbicida di alcuni prodotti per la sterilizzazione parziale del terreno. (**Further tests of the fungicidal and herbicidal effects of certain soil sterilants.**)
Boll. Staz. Pat. veg. Roma, 1959 (issued 1960), **17**: 71-90, bibl. 9, illus.

Tests were made on seed-beds at the Tobacco Institute of Prilep, Macedonia, with the following: Vapam at 1·0%, Crag-Mylone 85W at 0·4%. Bedrench at 1·5%, Vapam + allyl alcohol (50% + 50%) at 1·0%, and DD at 30 c.c./sq.m. + allyl alcohol at 0·75%, treatment being given 20 days before sowing tobacco seed. All were successful in preventing emergence of numerous weeds except those of *Trifolium* spp. Fungicidal effects against *Thielaviopsis basicola* were equally significant. It was not possible to determine whether they affected the actual production of tobacco seedlings. The two combined treatments are not recommended. [See also *H.A.*, 29: 3782.]

5660. PATEL, H. K.
Earthworms in tobacco nursery and their control.
Indian Tobacco, 1960, **10**: 56.

By emulsion sprays of 0·01% endrin or, less effectively, Folidol 0·03% and aldrin 0·05%.

5661. BOČAROV, P. I.
Trials on growing direct seeded mahorka with sprinkler irrigation. [Russian.]
Tabak, 1960, **21**(1): 15-18.

At Saratov the cost of sowing mahorka directly in the field was only one-twelfth that of planting out seedlings, the water required for sprinkler irrigation of the sown crop was about one-half of that needed for furrow irrigation of the transplants and the yield was 21% higher. Sprinkler irrigation made complete mechanization of crop production possible.

Environment, irrigation and nutrition.

(*See also* 4691, 5661, 5681, 5698, 6310, 6322.)

5662. WAGGONER, P. E., PACK, A. B., AND REIFSNYDER, W. E.
The climate of shade. A tobacco tent and a forest stand compared to open fields.
Bull. Conn. agric. Exp. Stat. **626**, 1959, pp. 39, bibl. 20, illus.

The tent, which approximates to a forest canopy, reduces light intensity and thus may cause reduced carbon fixation by the tobacco. The effects of high winds and evaporation are also reduced, and the plants suffer less often from drought and fewer growth checks and require less water for irrigation purposes. Data on the micro-climatic conditions found under tents are presented and discussed in detail.

5663. TOTSUKA, T., AND MONSI, M.
Effect of water economy on plant growth. I. Influence of lowering the water level on the growth of water-cultured tobacco plants.
Bot. Mag., Tokyo, 1959, **72**: 367-74, from *Tob. Abstr.*, 1959, **3**, Abstr. 1,949.

By lowering the water level a water deficit was induced in the leaves but not in the stems or roots, and there was a clear relationship between the leaf water deficit and the ratio of submerged roots to leaf area. The net assimilation rate decreased almost linearly with increased leaf water deficit, but there were no changes in respiration activity or N content. It appears that the primary cause of growth depression associated with lowering of the water level was the suppression of photosynthesis.

5664. HITIER, H., AND OTHERS.
Influence de l'arrosage par aspersion sur le rendement et la qualité des tabacs. (**The effect of sprinkler irrigation on tobacco yield and quality.**) [English summary ½ p.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 239-64, bibl. 3.

In trials over 4 years with Paraguay P.48 grown in alluvial soil the treatments were unirrigated control, frequent irrigation whereby the water deficit at

0–30 cm. was not allowed to exceed 20 mm., infrequent irrigation whereby the deficit was not allowed to exceed 30 mm., low N. (60 kg./ha.) and high N (120 kg.). The results and conclusions were: (1) In general, irrigation was not beneficial, causing a slight increase in yield but a slight decrease in quality, so that total value was reduced. (2) In normal years irrigation reduced quality without significantly increasing yield, thus resulting in a loss, whereas in dry years it gave a distinct increase in yield but a reduction in quality; in both normal and dry years it reduced nicotine contents. (3) There was no significant difference between the yields with frequent and infrequent irrigations, but in dry years frequent irrigation increased yield at the expense of quality. (4) Weight increases and quality reductions due to irrigation were greater in the lower leaves, reductions in value thus being chiefly confined to the lower leaves while the upper leaves sometimes benefited. (5) N appeared to aggravate the unfavourable effects of irrigation. (6) The injurious effects of irrigation are presumed to be due to leaching, and more water than the cultivated zone of the soil can hold should not be applied. On soils with a high moisture-holding capacity irrigation is best withheld or carried out only infrequently.

5665. Koenig, H. J.
Zur Frage der Beregnung der Tabakpflanze. **(On the irrigation of the tobacco plant.)** [English summary 1½ pp.]
Reprint from *Z. Acker- u. PflBau*, 1959, **109**: 195-225, bibl. 29.

Three growth stages were phenotypically determined, in each of which the cigar tobacco variety Havana II/c was able to utilize 20 mm. of irrigation (by sprinkler) to secure an enlarged leaf surface. These were: (1) in the middle of the primary growth period when the growing point emerges from the enveloping leaves, (2) at the onset of flowering and (3) at the period of greatest leaf development before harvesting the "sand" leaves. Irrigation is also recommended during hot dry weather, as soon as the crop has more or less filled in, i.e. after ridging up, and again when suckers are pinched out for the second time during the middle cropping period. When planting out it is enough to irrigate sufficiently to moisten the soil. The beneficial effects of irrigation can be judged from the increase in leaf surface that results if irrigation is started when the plants possess 10–13 leaves more than 8–10 cm. wide. The faster the leaf area is able to increase for middle and main cropping periods, the better will be the yield and leaf quality. By this time the "sand" leaves are fully developed. The K_2O, CaO and P_2O_5 contents as percentages of leaf dry matter reach a maximum at the beginning of the flowering phase and thereafter decline. The differences between irrigated and non-irrigated crops are not significant in wet years. In the total leaf harvested at the end of the wet growing season of 1953 the respective amounts of K_2O were 111·4 kg./ha. in non-irrigated tobacco, 72·6 kg./ha. when irrigation was started 14 days after planting out, and 134·9 kg/ha. when irrigation began during the middle of the growing period. For CaO the corresponding values were 82·0, 54·8, and 93·3 kg./ha. and for P_2O_5 7·6, 5·4, and 9·2 kg./ha. [From authors' summary.]—Landw. Hochsch. Hohenheim and Bundesanst. Tabakforsch.

5666. Merker, J.
Über die korrelativen Zusammenhänge zwischen einzelnen Bodenfaktoren und der Entwicklung sowie dem Ertrag und der Qualität des Tabaks. **(Correlative relationships between various soil characteristics and the growth, yield and quality of tobacco.)** [Russian and English summaries 1 p. each.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 161-210, bibl. 37, illus.

An investigation of 26 soil samples has shown that the influence of the soil on tobacco growth and development can be considerable; and that high soil-N can retard young plants. Under similar environmental conditions the leaf yield on the various soils was found to vary appreciably. Differences, e.g. in the weight per unit of leaf area, caused by the different soils were greatest at the first harvest and lowest in the upper leaves. Variation in the N content of the leaves was slight, and the nicotine content was not solely determined by the N content of the soil. Havana IIc showed a higher N assimilation rate than Wohlsdorfer Burley. Quantities of reducing substances in varieties with high sugar contents were greatly influenced by the soil type. The lower leaves showed a greater difference in soil-dependent Cl content than the upper leaves. Antagonism was found between the K_2O and CaO contents.

5667. Parups, E. V., and Nielsen, K. F.
The growth of tobacco at certain soil temperatures and nutrient levels in greenhouse.
Canad. J. Plant Sci., 1960, **40**: 281-7, bibl. 8.

Two varieties of tobacco, Hicks, a flue-cured variety, and Resistant Havana 211, a cigar variety, were grown at soil temperatures of 46°, 59°, 72° and 85° F. in a greenhouse. Three rates each of N, P_2O_5 and K_2O were applied in a factorial combination. The best soil temperature for growth was around 72° F. as indicated by measurements of leaf weight, leaf area, number of leaves, stalk weight and stalk length. The 46° F. soil temperature was too low for good growth. Resistant Havana 211 grew better generally at the low and high soil temperatures. Phosphorus appeared to be the most important and beneficial nutrient element for growth at the lower soil temperatures. [Authors' abstract.]—Dep. Agric., Ottawa.

5668. Anon.
Abonos para los tabacales. **(Fertilizers for tobacco plantations.)**
Suelo Tico, 1959, **11**(42): 41-6.

A summary of data presented at the 1958 Annual Conference of Tobacco Growing, Athens, Ga, U.S.A., covering major and minor elements.

5669. Postiglione, L.
I concimi complessi nella coltivazione del tabacco. **(The use of compound fertilizers for tobacco.)**
Tabacco, 1959, **63**: 407-24, bibl. 8.

Three years' trials at Scafati with different compound and simple fertilizers on burley tobacco showed no difference in results as between the different types of fertilizer. Decreased quality and quantity resulted from non-application of any sort of fertilizer.

5670. Ivanovsky, M.
Nutrition foliaire du tabac. **(Foliar nutrition of tobacco.)**
Rev. int. Tabacs, 1960, **35**: 43-4.

Trials were carried out on a compact chernozem soil on tobacco following Sudan grass, the tobacco receiving basic manuring before planting. Plants were set out in spring in the field, spaced 35 cm. between plants and 60 cm. between rows. NPK was applied in the form of a solution containing nitrate of ammonia, superphosphate, sulphate of potash or kainit, and different plants were given 1 up to 3 applications by knapsack sprayer. Control plants received nil or equivalent amounts of pure water. The result was a 12·9% increase in crop, there being, however, little difference in that achieved by 1, 2 or 3 applications. From this it is concluded that the all-important application is the first one, which takes place soon after planting out. Quality was unaffected.

5671. Bowling, J. D.
Relation of fertilizer composition to growth and development of Maryland tobacco.
Bull. Md agric. Exp. Stat. **A-101,** 1959, pp. 19, illus,. from *Tob. Abstr.*, 1960, **4**, Abstr. 227.

Field plot tests were conducted for 5 years on a representative tobacco soil in southern Maryland. All fertilizer mixtures included, in addition to N, P and K, constant amounts of Ca, S, Mg and B. Flowering of the plants was hastened by increased applications of N, but was unaffected by increases in K and P. The ratio of leaf to stalk in the cured plant was not influenced by the amount of fertilizer nutrients used in the test. The best yields were obtained with 90 lb. N, 60 lb. P_2O_5 and 240 lb. K_2O per acre. When the price per lb. was the only consideration, 30, 60 and 60 lb./acre of N, P_2O_5 and K_2O, respectively, gave the best results. On the basis of high acre-returns and good leaf burn the best results were obtained with 60 lb. N, 60 lb. P_2O_5 and 240 lb. K_2O per acre.

5672. McKee, C. G.
The effects of fertilizer rate, method of fertilizer application and plant spacing on the yield, quality, value and burn of Maryland tobacco.
Diss. Abstr., 1960, **20**: 3004-5, being *L.C. Card No. Mic.* 59-6856 of 76 pp.

Twenty-two treatments were involved in a 3-year study. All possible combinations were compared of 3 rates of fertilizer (750, 1,500 and 2,000 lb. of 4–8–12), 3 plant populations (4,900, 7,128 and 8,712 plants per acre) and 2 methods of fertilizer application (broadcast entire amount and band 750 lb. with balance, if any, side-dressed). In addition, there were two 1,500 lb. band fertilizer treatments and two side-dressing treatments. The fertilizer rate proved the most important factor; the two higher rates resulted in a greater yield, a higher average price per lb. and a greater monetary return than the low rate, but they reduced the leaf burn time. In 2 seasons there were no essential differences attributable to the method of fertilizer application, but in the third the band-split-method of application was superior to the broadcast method, an effect which was probably attributable to weather conditions. The plant population had the least effect of the 3 factors investigated, although the medium plant population produced a higher average value than either the lower or the higher population. The higher plant population, the low fertilizer rate and the band method of application all favoured a longer duration of leaf burn.—Univ. Md.

5673. Chandnani, J. J., Thomas, A. I., and Babu, R.
Effects of nitrogen, phosphorus and potash on *Nicotiana rustica* tobacco.
J. Indian Soc. Soil Sci., 1959, **7**: 107-13, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-175.

The application of 40–80 lb. N per acre to 3 sandy loams increased the weight per unit area of leaf, yield of cured leaf per acre, and leaf N and nicotine contents. The addition of 40–80 lb. P_2O_5 per acre only increased the yield of cured leaf per acre but had no other effect. K had no effect.

5674. Nebot, R.
Alteraciones en la floración y la fructificación de la *Nicotiana rustica* L. motivadas por la deficiencia de elementos minerales fundamentales. **(Changes induced in the flowering and fruiting of *Nicotiana rustica* by deficiency of essential mineral elements.)**
Farmacognosia, 1959, **19**: 313-20, bibl. 6.

In sand-culture experiments flowering, and more particularly fruiting, were accelerated by N deficiency. Delays in flowering caused by deficiencies of other nutrients increased in the order: Mg (almost nil), P, Ca, S, K. The percentage of plants producing flowers was reduced to 65 by P deficiency, 40 by S deficiency, 28 by K deficiency and 60 by Mg deficiency. The percentages of plants fruiting under the deficiency conditions were: N 100, P 65, S 23, K 0, Ca 17, Mg 60.

5675. Samuels, G., Vélez-Santiago, J., and Manzano, M.
A comparison of ammonium sulfate and urea as tobacco fertilizers. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1960, **44**: 35-9, bibl. 5.

Results of fertilizing cigar-filler tobacco with ammonium sulphate and urea showed no significant differences in yield, cash value per pound or per acre of cured tobacco, or smoking quality of cigars made from the tobacco, except for a whiter ash from the urea-fertilized tobacco. Tobacco grown without N gave lower yields.

5676. Garz, J.
Beziehungen zwischen Stickstoffernährung u. Phosphatstoffwechsel des Tabaks. **(The relationship between nitrogen nutrition and phosphate metabolism in tobacco.)**
Flora, 1959, **148**: 212-17, bibl. 5, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 60/116.

Nitrogen manuring was shown to increase the protein and nucleic acid-phosphorus content of tobacco leaves, whereas the diphosphate content declined to some extent. In ageing leaves the nucleic acid content was found to decrease, while the total phosphate content remained unchanged.

5677. McEvoy, E. T.
Influence of culture solution temperature on uptake of phosphorus by flue-cured tobacco plants.
Canad. J. Plant Sci., 1960, **40**: 211-17, bibl. 8.

In solution culture P^{32} uptake increased significantly as the temperature increased from 10° to 35° C. for absorption periods of 2, 4, and 6 days. There was a further increase in P^{32} uptake at 40° C. for absorption periods of 2 and 4 days, but a decrease after 4 days. Increase in root growth during the absorption periods bore no relation to increase in P^{32} uptake with increasing temperature. [From author's abstract.]—Dep. Agric., Ottawa.

5678. Chouteau, J., and Renier, A.
Relation entre les teneurs en potassium total des feuilles de plantes de tabac et les teneurs en potassium échangeable ou assimilable des sols sur lesquels elles sont cultivées. **(The relationship between the total potassium content of tobacco leaves and the exchangeable or assimilable potassium content of the soil on which the plants are grown.)** [English summary 8 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 227-38, bibl. 2.

Experiments in 1956 and 1957 showed that: (1) the K content of mature leaves is an inverse function of the height of their point of insertion on the stem; (2) the K content of the lower leaves falls between the date of priming and final harvesting; (3) the K content of the leaf is strongly influenced by the exchangeable K content of the soil; (4) the lower the soil K, the greater is the increase in leaf K resulting from K fertilization; (5) in soils containing more than 0·2‰ of exchangeable K_2O K manuring is unlikely to affect leaf characters and should be limited to the amounts removed by the crop; (6) in soils containing less than 0·2‰ of exchangeable K_2O the lower the soil K, the heavier should K manuring be.

5679. Okuda, A., and others.
Répartition du K^{42} absorbé par des plantes de tabac cultivées sous différentes conditions d' approvisionnement en potassium. **(Distribution of K^{42} absorbed by tobacco plants grown under different conditions of potassium nutrition.)**
Mem. Kyoto Univ. Res. Inst. Food Sci., 1958, No. 15, pp. 16-22, bibl. 1, condensed in *Rev. int. Tabacs*, 1959, **34**: 147, 149, bibl. 1.

See *H.A.*, 29: 3744.

Morphology and growth.

5680. Bonnand, J.
***Nicotiana tabacum* L. Vegetative cone and morphology.** [French].
Rev. Cytol. Biol. vég., 1959, **20**: 187-228, from *CORESTA Inf. Bull.*, 1960, No. 1, Abstr. 3,350.

The vegetative development of *N. tabacum* (var. White Burley) occurs in two phases: (1) The rosette phase, during which the vegetative cone is localized in 3 zones, the initial ring and the intercalary and medullary meristems; (2) the elongation phase, characterized by an increase and extension of the meristems and by increased mitotic activity in the apex and the subjacent tissues. Mitosis precedes the lengthening of the stalk. There are 2 types of phyllotaxis in *N. tabacum*. The leaves are decurrent, and in some varieties the decurrent limb forms wings resembling stipules but distinguished from them by vascularization and late development.

5681. Chouteau, J.
Répartition pondérale au système radiculaire du tabac Paraguay dans une terre d'alluvions profondes. **(Weight distribution of the root system of Paraguay tobacco on a deep alluvial soil.)** [English summary 7 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 265-74, bibl. 1.

Of the total root system of a crop growing on a light alluvium with a compact layer at 30 cm, 98–100% by weight was located between 0 and 30 cm. It was concluded that any method of irrigation which carried nutrients below, or to the bottom of, this zone might considerably reduce the nutrients available to the plant.

5682. Barnard, C.
Leaf structure in relation to quality in flue-cured tobacco.
Aust. J. agric. Res., 1960, **11**: 169-85, bibl. 15, illus.

There is a close relationship between the anatomy and morphology of the leaf and its position on the stalk. Indices used by the tobacco trade in assessing leaf quality are also closely associated with leaf position. Thickness and weight per unit area of leaf are measures of "body", while cell size and compactness of cell arrangement are the physical basis of "grain". "Elasticity" is not related to any particular anatomical or morphological characters; it is associated with some water-soluble constituent or constituents of the leaf, which enable the leaf to remain pliable at low moisture contents. "Lustre" also is not related to any structural features. Indirect evidence suggests that "lustre" is an indicator of chemical composition. "Body" and "grain" of the cured leaf might be forecast from the anatomical structure of the green leaf, but "elasticity" and "lustre" could not be forecast. [From author's summary.]—C.S.I.R.O., Canberra.

5683. Özkan, N.
Tütün yaprağindaki ifraz tüyleri ve stoma sayisi ile bazi kalite faktörleri arasindaki münasebet ve dikim araliklarinin bu faktörler üzerindeki tesirleri. **(The relation between the glandular leaf hairs and stomata of tobacco leaves and some quality factors, and the effects of transplanting distances on these factors.)** [English summary ¾ p.]
Inhis. Enst. Raporl., 1959, **8**: 1-26, bibl. 24, illus.

An aromatic and a non-aromatic type of tobacco were transplanted into rows 40 cm. apart at close (10 cm.) and wide (30 cm.) spacing. The density of long glandular hairs was greatest in the aromatic type and especially on the upper leaves. This density increased with close spacing in the aromatic type, but not in the other tobacco. In both types the density of short glandular hairs was greatest on the upper surface of the leaf, whereas long glandular hairs and stomata were more numerous on the lower surface. Non-glandular hairs occurred in equal numbers on both leaf surfaces.

5684. Seltzmann, H.
Gibberellins? Not for tobacco.
Res. and Fmg, N.C., 1959, **18**(2): 7, illus.

Producing tall, spindly growth with no appreciable yield increases.

5685. Yager, R. E.
Effect of removal of leaves at various developmental stages upon floral abscission in tobacco.
Phyton, 1959, **13**: 125-31, bibl. 12.

The removal of leaves had the effect of accelerating the abscission of unfertilized flowers in tobacco. The effect of upper leaves is greater than that of lower leaves. In addition, removal of leaves at later stages of development affects abscission to a greater extent than removal of leaves at earlier developmental stages. Repeated removals of upper leaves during the maturation of the plant produce the most striking acceleration of abscission. IAA added to the exposed nodes causes a retardation of floral abscission, as it reverses the accelerating effect of the leaf removals. Increased concentrations cause an increase in the retardation. The young upper leaves, which are rich in natural auxin, appear to exert the most marked effect upon abscission. This effect is greatest when the upper leaves are removed periodically as they form throughout the development of the plant. Such treatment results in repeatedly lowering the internal auxin level as it is raised by new developing leaves. [Author's summary. See also *H.A.*, 28: 3817.]—St. Univ. Iowa.

Physiology, biochemistry and crop composition.

(*See also* 4710, 4771, 5651, 5666, 5676, 5678, 5684, 5685, 6297.)

5686. Sastry, A. S., and Sitapathi, P.
Chemical composition of tobacco leaves and its influence on the grade obtained on flue-curing.
J. sci. industr. Res., India, 1959, **18A**: 472-8, bibl. 16, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-175.

Statistical correlation between the chemical constituents in the green leaf of *Nicotiana tabacum* var. Chatham and the quality of the cured leaf have been worked out. The influence of moisture and starch in the former on the quality of the latter is positive, whereas that of N in the fresh leaf is negative. Moisture appears to be nearly twice as important as starch with respect to the final quality of the cured leaf. Chlorophyll is probably held by the proteins, and simultaneous degradation takes place, unmasking the yellow colour of the leaves; carbohydrates facilitate re-synthesis of the proteins and moisture aids the mobility of the carbohydrates. Nitrogenous substances are unfavourable and plants should be grown with a minimum concentration consistent with normal growth. Leaves should be covered with wet gunnies to protect them from the sun; the quality of top leaves can be improved by culturing them in water before curing [see *H.A.*, 29: 1593].

5687. Uzunovski, M., and Georgievski, D.
The effect of spacing on the more important biochemical constitutents of the tobacco variety Prilep. [Serbo-Croatian, with English summary.]
Duvan, 1959, **9**: 245-52, from *Tob. Abstr.*, 1960, **4**, Abstr. 20.

Wide spacing caused nicotine, total N, protein N, and protein contents to increase. Soluble sugar contents did not vary greatly. The Shmuk number was greater with closer spacings.

5688. Sastry, A. S., and Kadam, B. S.
Chemical composition of leaf in flue-cured tobacco in relation to stalk position.
Indian J. Agron., 1959, **4**: 1-7, bibl. 3.

Studies over a period of 2 years of each individual leaf of normal Harrison Special plants selected at random have shown that, on the basis of chemical composition, the leaves fall into four zones. The bottom 4 leaves up to morphological position No. 11 are low in starch, somewhat high in N and low in sugars in the cured leaf. The second zone up to leaf position No. 21 is high in starch and in sugars in the cured leaf, but low in N. The third zone up to leaf position No. 25 is high in starch and sugars and fairly high in N. The upper 6 leaves are high in N, but starch and sugars are markedly reduced.—Cent. Tob. Res. Inst., Rajahmundry.

5689. Sastry, A. S.
Some observations on the rates of proteolysis during flue-curing of tobacco leaves.
Proc. Indian Acad. Sci., Sect. B, 1960, **51**: 219-26, bibl. 16.

See *H.A.*, 29: 620.

5690. Carruthers, W., and Johnstone, R. A. W.
Alcohols of tobacco: solanesol and n-docosanol.
Chem. Ind. Lond., 1960, No. 27, pp. 867-8, bibl. 5.

Spectrometric identification.

5691. Viart, M. P.
Étude chromatographique de la variation des acides aminés libres du tabac pendant le séchage à l'air naturel. **(A chromatographic study of changes in the free amino acids in tobacco during air curing.)** [English summary 11 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 275-85, bibl. 3, illus.

The chief free amino acids present in Paraguay leaf at harvesting time are α-alanine, γ-amino-butyric acid, threonine, glutamine, cystine, cysteine, valine, leucine, proline and serine. Asparagine, aspartic acid, glutamic acid and phenylalanine appear during curing, while others, including valine and leucine, disappear. Proteolysis begins soon after harvesting, is most intense about the end of the yellowing stage and then declines.

5692. Onishi, I., and others.
Studies on the essential oil of tobacco leaves. Part 18. Synthesis of γ-phytadiene derivative. [Japanese.]
Onishi, I., Fukuzumi, T., and Takahara, H.
Idem. Part 19. Infrared spectra of coloured derivatives of alcohols and phenols. [Japanese.]
Sci. Pap. cent. Res. Inst. Japan Monop. Corp., 1959, No. 101, pp. 16-19, 20-4, from *CORESTA Inf. Bull.*, 1960, No. 1, Abstr. Nos. 3,328 and 3,329,

Parts 1-17 were noted in *H.A.*, 29: 3791n.

5693. Bendoraitis, J. G., and others.
Evidence for the presence of high molecular weight cyclic paraffins in tobacco leaves.
Chem. Ind. Lond., 1960, No. 26, pp. 838-9, bibl. 9.

Extracted from cured, non-aged leaves.

5694. Kataoka, S., Hamashima, T., and Taguchi, T.
Auto-oxidation of chlorogenic acid. [Japanese.]
Sci. Pap. cent. Res. Inst. Japan Monop. Corp., 1959, No. 101, pp. 1-5, from *CORESTA Inf. Bull.*, 1960, No. 1, Abstr. 3,323.

To caffeic and quinic acids in aqueous solution; ground Bright Yellow tobacco exposed to a dry air flow for 200 hours also lost 5·8% of its chlorogenic acid.

5695. Christy, M. G., and Samfield, M.
The average degree of polymerization (D.P.) of cellulose in various tobacco types. Part I —Experimental.
Samfield, M., and Christy, M. G.
Idem. Part II—Results.
Tobacco, N.Y., 1960, **150**(9): 25-30, bibl. 18, and (10): 23-7, bibl. 4.

The product of cellulose content and D.P. was found to be characteristic of the tobacco type. Lower grades had a lower D.P. and higher cellulose content.—Liggett and Myers Tob. Co., Durham, N.C.

5696. Ammons, C. R., Jr.
Tobacco cuticle: source of tars?
Res. and Fmg, N.C., 1959, **18**(2): 15.

A note mentioning, but not describing, a novel technique used to separate the cuticle from the leaf by means of a pectinase solution.

5697. Asmaev, P. G., and Vasilenko, V. M.
Determination of moisture in tobacco. [Russian.]
Izv. Vyssh. Ucheb. Zaved. Pishch. Tekh., 1959, No. 2, pp. 78-82, from *Tob. Abstr.*, 1960, **4**, Abstr. 188.

The cryohydrate method for determining moisture, modified by substituting 96% ethyl alcohol for extraction of the sample and by the addition of an alcoholic solution of $Al(NO_3)_3.9H_2O$ to liquefy the colloidal material, was compared with drying at 96° C. Aviation petrol was used as the second solvent. Compared with this method, which was rapid and quantitative, drying at 96° gave low and inaccurate results for cigarette tobacco and tobacco ferments owing to the loss of volatile matter.

Disorders, diseases and pests.

(*See also* 4681, 5615, 5647-5650, 5657-5659, 6316, 6329.)

5698. Taylor, G. S., DeRoo, H. C., and Waggoner, P. E.
Moisture and fleck of tobacco.
Tobacco, N.Y., 1960, **150**(14): 21-8, bibl. 8, illus.

The wilting of detached leaves of a shade variety of tobacco increased their resistance to injury induced by the toxicant, presumably ozone, in air irradiated with ultra-violet light. In field trials a broadleaf tobacco showed less weather fleck from smog, when the soil moisture tension was $\frac{1}{2}$–2 atmospheres compared with $\frac{1}{3}$–$\frac{1}{2}$ atmosphere, the fresh weight yield of leaf being 10% higher in the former case. Where the soil moisture was reduced to 70% of field capacity 4 days before smog occurred, shade tobacco developed considerably less weather fleck. [See also *H.A.*, 29: 3775.]—Conn. agric. Exp. Stat., New Haven and Windsor.

5699. Orieux, L.
A survey of tobacco diseases in Mauritius.
Rev. agric. sucr. Maurice, 1960, **39**: 92-8, bibl. 3, illus.

Alternaria, frog-eye (*Cercospora nicotianae*) and other seed-bed and field diseases, including those due to bacteria, viruses and physiological causes. Control measures are outlined in some cases.

5700. Berger, P., and Müller, B.
Tabakrippenbräune bei den Sorten Geudertheimer III und Havana IIc. **(Brown rib in Geudertheimer III and Havana IIc varieties.)** [Russian and English summaries $\frac{1}{4}$ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 221-30, bibl. 4, illus.

Both varieties show several different reactions to strains of the brown rib virus. Some plants show brown rib symptoms, whereas others appear to show tobacco rattle symptoms and yet others remain symptomless.

5701. Izard, C., and Berg, T. M.
Une nouvelle méthode d'identification des virus de la mosaique du tabac et X de la pomme de terre. Par chromatographie sur papier: Application à l'étude des relations entre l'orobanche et le tabac, en présence de ces deux virus. **(A new method of identifying tobacco mosaic and potato X viruses by paper chromatography: its application to a study of the relations between broomrape and tobacco in the presence of these two viruses.)** [English summary 7 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 215-25, bibl. 8, illus.

The method of identification described employs circular paper chromatography in the presence of specific antisera. When used in inoculation tests between tobacco and broomrape it revealed that tobacco mosaic and potato X viruses could not be transmitted to broomrape either from tobacco plants or by direct inoculation.

5702. Lucas, G. B.
Milk for mosaic control.
Res. and Fmg N.C., 1959, **17**(4): 15.
More about milk for mosaic control.
Res. and Fmg N.C., 1959, **18**(2): 13, illus.

In continuation of earlier work [*H.A.*, 29: 2646] the first article notes that the application of 5 gal. of milk per 100 yd. of seed-bed just before transplanting by workers whose hands were contaminated by TMV reduced the number of infected plants 4 weeks after treatment by over 50% compared with plants that had not been treated with milk. [For similar work on vegetables see *H.A.*, 30: 753.] The second article records that it is the milk proteins, especially casein and certain globulins, which are effective. Blood proteins from cows have given a similar degree of control.

5703. Lucas, G. B., and Hare, W. W.
The inhibition of tobacco mosaic virus by proteins from bovine milk and blood serum.
From abstr. in *Phytopathology*, 1959, **49**: 544.

Using detached leaves of *Nicotiana glutinosa*, the inhibitory effect of various components of cow's milk and blood on TMV was tested quantitatively. Leaves were sprayed with inhibitor material and inoculated 1 to 60 minutes later with TMV, or a mixture of test solution and TMV was rubbed on the leaves. Lactalbumen, α-lactoglobulin and β-lactoglobulin were weak inhibitors, whereas casein and the crude whey protein fraction of milk were much stronger inhibitors. Bovine blood γ-globulin, fibrinogen and albumen were weak inhibitors, but α-globulin and β-globulin were stronger. None of these compounds at the concentrations used (approx. 0·2%) had the inhibitory power of reconstituted skim or homogenized milk.

5704. Knypl, J. S., and Gubański, M.
The inhibitory effect of coumarin on the tobacco mosaic virus (TMV) reproduction in tobacco leaf-discs.
Naturwissenschaften, 1960, **47**: 308-9, bibl. 10.

Multiplication of TMV inhibited by low concentrations of coumarin.

5705. Maine, E. C., Tove, S. B., and Kelman, A.
Pathological alterations in respiration of tobacco stem tissue affected by *Pseudomonas solanacearum*.
From abstr. in *Phytopathology*, 1959, **49**: 545.

Respiration of stem tissue of both resistant and susceptible tobacco increased following infection, the greatest increase being in diseased susceptible tissue.

5706. Marcelli, E., and Capozzi, A.
Sull'azione di alcuni antibiotici sul tabacco. **(The effect of certain antibiotics on tobacco.)**
Tabacco, 1959, **63**: 371-84, bibl. 12.

Application of 7 different antibiotics, found efficacious in varying degree against *Pseudomonas tabaci*, was made at normal concentrations to tobacco seed-beds, to tobacco seeds germinated *in vitro* and to tobacco plants in a glasshouse. Nearly all the tested substances were found in varying degree to inhibit growth. Their action was most marked on freshly germinated seeds and decreased as plants grew older. Albinism was often induced.

5707. Calpouzos, L., Theis, T., and Colberg, C.
Effect of low-volume oil sprays studied on *Cercospora* diseases of several crops.
From abstr. in *Phytopathology*, 1959, **49**: 535.

Trials have shown that an oil, which controls *Cercospora musae* on bananas, does not control *C. nicotianae* on tobacco or *C. zinniae* on zinnias.

5708. Renaud, R.
L'oïdium du tabac. **(Tobacco powdery mildew).**
Rev. int. Tabacs, 1959, **34**: 151-60, 176-80, bibl. 80, illus.

This review includes notes on indirect control by cultural practices, such as those leading to good air circulation, and by planting resistant varieties, e.g. some Maryland and burley varieties, and on direct control by chemical treatments, in particular with Karathane and sulphur.

5709. Nusbaum, C. J.
Effects of cultural practices following tobacco harvest upon root-knot nematode populations.
From abstr. in *Phytopathology*, 1959, **49**: 547-8.

Tobacco roots left undisturbed in the soil after harvest favoured the build-up of populations of *Meloidogyne incognita* and *M. incognita acrita* during the autumn and winter. Ploughing-out or disking roots immediately after harvest, or sowing small grain crops after ploughing or disking prevented further nematode reproduction and reduced winter survival, so that in the spring populations were less than one-tenth those in plots with undisturbed roots. [See also *H.A.*, 29: 3786.]

5710. Anon.
El combate del cogollero del tabaca. **(Control of the tobacco bud worm.)**
Not. agríc. Serv. Shell Agric., Cagua, No. 35, 1958, p. 3-4, illus.

Recommendations on control of *Heliothis virescens* in Venezuela.

5711. Begg, J. A.
Seed-corn maggot infestations in flue-cured tobacco.
Lighter, 1960, **30**(1): 17-20, illus.

The damage caused by, and the life history of, *Hylemya cilicrura* are described. Soil treatment with aldrin or heptachlor (1–3 lb./acre) and planting-water treatment with lindane, aldrin, dieldrin or heptachlor w.p., whilst noticeably reducing injury, did not give adequate control.

5712. Anon.
Des essais indiquent que l'insecticide Sevin donne d'excellents résultats contre les sphingides ravageurs du tabac cultivé à l'ombre. **(Trials show that Sevin gives excellent control of the sphinx moths attacking shade-grown tobacco.)**
Rev. int. Tabacs, 1959, **34**: 229.

When several insecticidal dusts were applied weekly at 10–20 lb. per acre for the control of *Protoparce* spp., the best results were given by 10% Sevin and 2% endrin, namely, 95·8–96·3 and 95·3–96·3% uninfested plants, respectively, compared with 82·3–84·9% in the control. Other products tested were DDT, TDE and parathion. Sevin was not phytotoxic and did not leave a visible residue.

5713. Michel, É.
Nouveaux essais contre les larves de taupins. Étude du traitement préalable du plant par arrosage sur semis. **(New trials for the control of wireworms. A study of preventive treatment by watering the seed-beds.)** [English summary 6 lines.]
Ann. Inst. exp. Tabac Bergerac, 1959, **3**: 317-32, bibl. 2, illus.

Effective protection was conferred by treating seedlings just before lifting with 80g. of 6% lindane w.p. or 100 g. of 40% aldrin w.p. in 8–10 1. water per 5 sq.m. of seed-bed. The plants should be copiously watered with pure water immediately afterwards to wash the leaves and transplanted with abundant earth adhering to the roots to ensure early establishment and protection from wireworms. In cases of light infestation 60 g. of lindane proved sufficient.

Washing, curing and fermentation.

(*See also* 5689, 5691.)

5714. Smith, W. A.
Removal of lead arsenate from green tobacco leaf.
Qd J. agric. Sci., 1959, **16**: 249-50, bibl. 1.

Leaves from a crop which had been sprayed 4 times with lead arsenate (3 lb./50 gal.) were dipped and agitated for 30 seconds in 60 gal. of an acid detergent consisting of 0·25% w/w HCI and 0·25% detergent (22% secondary alkyl sulphate). After draining for 30 seconds the leaves were rinsed twice in 60 gal. of water, drained and then cured. Analysis showed that the arsenic residue was removed from the green leaves by this method, but the treated leaves were papery compared with untreated leaves.

5715. Bajlov, D. D.
Conditions and methods of tobacco curing in Bulgaria. [Russian.]
Tabak, 1960, **21**(1): 23-7, bibl. 6, illus.

An outline of different methods of curing [including that described in *H.A.*, 29: 3788].

5716. Melkumjan, V. E.
Tobacco curing without barns. [Russian.]
Tabak, 1960, **21**(1): 18-20, illus.

An illustrated description is given of cheap, easily constructed shelters for sun-drying tobacco. The leaves are strung between bearers on wooden uprights, which also carry movable roof sections made from light frames covered with bituminous paper.

5717. Amarell, H.
Über die Trocknung des Tabaks. (**Tobacco curing.**)
Dtsch. Agrtech., 1959, **9**: 221, illus., from *Tob. Abstr.*, 1959, **3**, Abstr. 2,034.

Although the greater part of the tobacco crop in the German Democratic Republic is cured by the traditional hanging method (4–6 weeks), a number of brick-built, coal-burning, hot-air, fan-drying barns have been installed. These effect curing in 20 hours at a temperature of 34–35° C. with about 80% R.H., followed by drying of the leaves at temperatures slowly raised from 35 to 55–60° C. and drying of the ribs quickly at 75° C. The process is completed by cooling for 3 hours and moistening again for 4 hours to reach 18% moisture content.

5718. Johnson, W. H., and others.
Bulk curing of bright leaf tobacco.
Tobacco, N.Y., 1960, **150**(12): 21-8, bibl. 7, illus.

The operation and results of a pilot plant for the mechanization of bright leaf curing are described [see also *H.A.*, 30:4021]. Chemical analyses did not reveal any significant differences between the product of this plant and that of conventional curing, and smoking tests were favourable.—N.C. St. Coll., Raleigh.

5719. Alcaraz, E.
La planta de tabaco y el agua. Control del agua durante el curado y la fermentación. (**The tobacco plant and its water supply. Control of humidity during curing and fermentation.**)
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 175-218, bibl. 73, illus.

Diagrams show the distribution of temperature and humidity in air-curing barns with the ventilators open by day and closed by night. During the first stage of curing the R.H. is 80–100%, and reduction of this depends on the method of curing, the weather and the variety of tobacco and its final use. The initial moisture content of tobacco for intensive enzymatic fermentation should be 20–25%, and for fermentation following a phase of microbial activity about 33%. For slow fermentation with little or no rise of temperature 10–13% is ample. Microbial activity is approximately proportional to moisture in the range of 20 to 35%, but enzymatic activity appears to be unaffected by wide variations. During fermentation a relationship exists between the R.H. of the air and the moisture content of the tobacco. An initial R.H. of 75–85% is necessary during the first few days to encourage active fermentation.—Inst. Biol. Tabaco, Seville.

5720. Izquierdo Tamayo, A., and de Medeiros Alvarez, A.
Estudios sobre la flora bacteriana del tabaco. III. Microflora de los tabacos del norte de España, Granada, Extremadura y Sevilla. (**Studies on the bacterial flora of tobacco. III. The microflora of tobaccos in northern Spain, Granada, Extremadura and Seville.**) [English summary ½ p.]
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 363-402, bibl. 8, illus.

Bacteria found in tobacco before and after fermentation.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS

Condiment and spice plants.

(*See also* 5492, 5749, 6300, 6301, 6310, 6311, 6332.)

5721. Sastri, R. L. N.
Vascularization of the carpel of *Myristica fragrans*.
Bot. Gaz., 1959, **121**: 92-5, bibl. 8, illus.
Anatomical studies on developing nutmeg fruits.

5722. Khan, K. F.
Here's how to push up your pepper yields.
Indian Fmg, 1960, 9(12): 33-5, 37, illus.
Varieties Kalluvalli and Balankotta and new hybrids described, with advice on manuring and plant protection.

5723. Dolar, S. G.
Preliminary trials in marcotting black pepper.
Philipp. Agric., 1960, **43**: 485-93, bibl. 12, illus.
Approximately 50% success was obtained by marcotting young shoots possessing root primordia at the start of the rainy season. Each marcot was enclosed in a can containing soil for 30 days before severance.

724. Di Crecchio, R.
Lo zafferano. (**The saffron crocus.**)
Ital. agric., 1960, **97**: 629-49, bibl. 8, illus.
Origin of cultivation, composition and uses of saffron, production and trade in Italy, soil requirements, cultural practices, commercial products from various countries, pests, diseases and economics.

Drug plants.

(*See also* 5318, 5724.)

5725. Parsa, A.
Medicinal plants and drugs of plant origin in Iran. III and IV.
Qual. Plant. Maveg., 1959, **6**: 137-56; and 1960, **7**: 65-136, bibl. 60.
Annotated alphabetical lists from *Dorema* to *Zizyphus*. [Earlier parts were noted in *H.A.*, 29: 3845p.].

5726. Anzaldo, F. E., Marañon, J., and Ancheta, S. F.
Screening of Philippine plants for steroidal sapogenins, III.
Philipp. J. Sci., 1958 (issued 1959), **87**: 191-5, bibl. 7.
Although 60% of the alcoholic extracts of plants from 8 families gave positive results to the hæmolysis test for saponins, only 17 showed spectroscopic evidence of the presence of steroidal sapogenins. Of these the most promising sources were the roots of radishes and carrots and the leaves of *Cinnamomum mercadoi*. [For part II, see *H.A.*, 29: 1606.] —Nat. Inst. Sci. Tech., Manila.

5727. Raffauf, R. F., and Flagler, M. B.
Alkaloids of the Apocynaceae.
Econ. Bot., 1960, **14**: 37-55, bibl. 145.
Chemical characteristics and sources of numerous alkaloids tabulated and discussed.

5728. Peeters, F. J.
De bestanddelen van de geneeskrachtige planten. (**The composition of medicinal plants.**)
De verzameltijd van de meest te gebruiken geneeskrachtige planten. (**The harvesting time of the more useful medicinal plants.**)
Cult. Hand., 1960, **26**: 105-6, and 151-2, 171.
Lists are provided of native Belgian plants containing various organic acids and mineral elements. Methods and times of harvesting are noted.

5729. Mariconi, F. A. M., and Zamith, A. P. L.
Notas sobre uma cochonilha e seu predador. (**Notes on a scale insect and its predator.**) [English summary ¼ p.]
Biológico, 1959, **25**: 258-65, bibl. 7, illus.
The scale insect *Mimosicerya hempeli*, a serious pest of *Cassia fistula*, was very resistant to soil applications of Metasystox and to injections of this compound into the tree trunk. Painting the branches with an oil-malathion mixture also gave very poor results. The predatory beetle *Exoplectra erythrogaster* in both larval and adult forms eats the nymphs of the pest.

5730. Mukherjee, S., and Chatterjee, S. K.
A new method for propagation of *Cinchona ledgeriana* Moens.
Sci. and Cult., 1960, **25**: 648-50, bibl. 4, illus.
One-year-old nursery seedlings or 6-month-old marcots were cut back to force out lateral shoots. These, up to 60 days later, when 1–3 in. long, were broken off and used as cuttings. The cuttings were set in a leaf-soil : coarse sand medium, kept moist and covered with polythene film in a frame fixed 4 in. above the medium. Between 60 and 74·2% success was obtained in 30–31 days. June-July was the best time of year.—Directorate of Cinchona, W. Bengal, Mungpoo (Darjeeling).

5731. Salo, V. M.
Materials for the pharmacognostic study of plant sources of colchicine. Part I. [Russian.]
Sb. nauč. Rab. Mosk. farmacevt. In-t, 1957, **1**: 221-7, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,503.
The discovery and medicinal uses of colchicine are reviewed. The best emergence of *Colchicum speciosum* (90%) occurred when the corms were planted 15–20 cm. deep. The colchicine content of the corms was highest in the spring when the leaves

were developing (1·492%) and in the autumn before flowering (0·878%). Colchicine was also found in the leaves (0·664%) and roots (0·182%). The best time for harvesting and processing the corms in the Moscow region is when the flowers start to emerge, at which time the content of colchicine is high (0·878%) and that of moisture relatively low (68·5%).

5732. Scott, A. I.
Biosynthesis of colchicine.
Nature, 1960, **186**: 556, bibl. 10.

A note on the elaboration of the tricyclic system in *Colchicum* spp.

5733. Maniquis, E. P.
Comparative studies of *Datura metel* L. and *Datura meteloides* Dunal.
Diss. Abstr., 1960, **20**: 3331-3, bibl. 17, being *L. C. Card No. Mic.* 60-88 of 112 pp.

The structure of the 2 species is similar, except that on the mature leaves of *D. metel* the glandular hairs are more numerous than on *D. meteloides*. The average total alkaloids content of *D. metel* was 0·499% and of *D. meteloides* 0·354% (both oven dried). The alkaloid constituents in *D. metel* were scopolamine 0·218%, hyoscyamine 0·179% and an unidentified compound 0·102%; the constituents in *D. meteloides* were scopolamine 0·202% and an unidentified compound 0·152%.—Ohio St. Univ.

5734. Mehra, P. N., and Mittal, T. C.
Indian substitutes of male fern in pharmacognosy.
Nature, 1960, **186**: 722-3.

Filicin was found in several other species of *Dryopteris* and in 2 species of *Ctenitis*. A field test for species rich in filicin is described, in addition to anatomical notes on species containing oleoresin and filicin.

5735. Ćorović, M., and Čanak, M.
Klijavost semena *Hyssopus officinalis* L. i promene na mladim biljkama pri zračenju semena x-zracima. **(The effect of X-rays on seed germination and seedling growth in *Hyssopus officinalis*)** [English summary 1 p.].
Arh. poljopr. Nauke, 1957, **10**(28): 3-13, bibl. 14, illus.

The rate of germination of the seeds was little affected by X-ray doses ranging from 100–35,000 r, although over 15,000 r there was some check to germination during the first 3 days. Doses of 100–20,000 r had a stimulating action on the percentage of germination, but this was not uniform. Plants from irradiated seeds were initially more vigorous, but their growth was subsequently checked, and doses above 100 r were sufficient to reduce final plant size. The response of the roots, morphologically and anatomically, was erratic but more marked at the higher rates. It is concluded that exposure to 100 r is beneficial, exposure to 100–12,000 r sometimes unfavourable and exposure to doses above 12,000 r always detrimental.—Inst. Bot., Belgrade.

5736. Maugini, E.
Ricerche sul genere *Mandragora*. **(Investigations on the genus *Mandragora*.)** [English summary ½ p.]
Nuovo G. bot. ital., 1959, **66**: 34-60, bibl. 56, illus.

Mandragora contains an alkaloid similar to that in *Atropa belladonna*. In investigations at the Italian Central Herbarium of the University of Florence the total alkaloid content of the rhizome of *M. autumnalis* was found to be 0·37% compared with 0·47% in *Atropa belladonna*. Anatomical and morphological data are provided on *M. autumnalis*.

5737. Chládek, M., and Košová, V.
Blütenfasziation bei der echten Kamille (*Matricaria chamomilla* L.). II. **(Flower fasciation in true chamomile (*M. chamomilla*). II.)**
Pharmazie, 1959, **14**: 476-8, from *Biol Abstr., Sect. D*, 1960, **35**, Abstr. 27,937.

The newly bred races of true large-flowered chamomile with typical flower fasciation produced high yields at harvest (up to 18·60 kg./acre) with a high content of azulenogenic active principles (up to 186·8 mg.%) and a high content of volatile oil. The great variability of torus diameters in the population of the improved races suggests further possibilities for selection and increased yields. The relatively easier breaking apart of the flower heads in the large-headed chamomile is advantageous in the processing of the drug.—Masaryk Univ., Brno.

5738. Nordestgård, A.
Forsøg med sorter af opiatvalmue 1948-1958. **(Variety trials with opium poppy.)** [English summary 12 lines.]
Tidsskr. Planteavl, 1960, **63**: 848-55.

Two Scandinavian varieties proved superior to a German variety.

5739. Remussi, C.
Mutaciones inducidas por la aplicación de rayos X. **(Mutations induced by X-ray treatment.)**
Rev. argent. Agron. B. Aires, 1959, **26**: 108-9.

Low morphine content and disease susceptibility are factors limiting the cultivation of opium poppies in Argentina. Experiments were started in 1959 on inducing mutation in 3 varieties. A dose of 25,500 r killed the seeds, but at 13,000 and 19,000 r some germinated.

5740. Sárkány, S., Andrásfalvy, A., and Farkas-Riedel, L.
Data on growth and development in poppy. [English, with German and Russian summaries ½ p. each.]
Acta agron. hung., 1959, **9**: 341-62, bibl. 9.

The growth of 3 varieties of opium poppy was studied under different conditions of day length and temperature. The results indicated that early spring and autumn sowings were more productive than May or June sowings. An increase in temperature shortened the vegetative period, but a further increase reversed this in 2 varieties. Winter hardiness was a varietal characteristic.—Eötvös Loránd Univ., Budapest.

5741. Dolgova, A. A.
A study of the ontogeny of the laticiferous system in the opium poppy. [Russian.]
Sb. nauč. Rabot Mosk. farmacevt. In-t, 1957, **1**: 161-5, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,179.

The development of the latex vessels in the Tian-Shan race of opium poppy was followed from germination to seed maturity. The current method of obtaining opium by making incisions on immature capsules was found to be uneconomic. A more rational utilization of the plant would result if the alkaloids were extracted from all organs during the period between flowering and seed maturity.

5742. Ottestad, E., and others.
Water soluble carbohydrate of *Papaver somniferum* L.
J. Pharm., Lond., 1959, **11**: 689-93, bibl. 10, from abstr. in *J. appl. Chem.*, 1960, **10**: i-498.

An aqueous extract of opium poppy capsules of Yugoslavian origin yielded glucose, fructose, sucrose, sedoheptulose, mannoheptulose and a complex polysaccharide.

5743. Grinkevič, N. I.
Pharmacognostic studies on *Pulmonaria mollissima*. Part I. [Russian.]
Sb. nauč. Rab. Mosk. farmacevt. In-t. 1957, **1**: 215-20, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,185.

During flowering plants of P. *mollissima* contain 1,333 mg.% vitamin C on a dry weight basis.

5744. Mia, A. J.
A comprehensive investigation on the morphology of *Rauwolfia vomitoria* Afzl.
Diss. Abstr., 1960, **20**: 2487-8, being *L.C. Card No. Mic.* 59-6570 of 129 pp.

In the embryonic, seedling and adult stages.

5745. Briggs, L. H., and others.
***Sophora* alkaloids. Part VI. The alkaloids of the bark and flowers of *S. microphylla*, and the isolation of diosmin from the flowers.**
J. chem. Soc. Lond., 1960, pp. 1955-6, bibl. 6.

5746. Battersby, A. R., and others.
Alkaloids of calabash-curare and *Strychnos* species. Part II. Isolation of new alkaloids.
J. chem. Soc. Lond., 1960, pp. 1848-54, bibl. 18.

The bark of *Strychnos toxifera* has been found to contain mainly quaternary alkaloids, together with a small amount of non-quaternary bases. Fractionation of the quaternary material has yielded 3 new alkaloids named hemitoxiferine-I, macusine-A and macusine-B, together with the known xanthocurine. The properties of the new alkaloids are described. [From authors' abstract. For part I, see *H.A.*, 30 : 4059.]—Bristol Univ.

5747. Ivanova, S. D.
The influence of the host plant on the pharmacological properties of white mistletoe. [Russian.]
Sb. nauč. Rab. Mosk. farmacevt. In.-t, 1957, **1**: 243-8, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,500.

The accumulation of choline derivatives was studied in the leaves and stems of *Viscum album* growing on different species. Biological activity was greatest in mistletoe growing on willows, and choline derivatives were more active in young than in old leaves.

Essential oils.

(*See also* 5533, 5692, 6054, 6300.)

5748. Chatterjee, S. K.
A note on the vegetative propagation of some of the essential oil yielding plants newly introduced at Mungpoo, Darjeeling.
Sci. and Cult., 1960, **25**: 687-8, bibl. 1.

IBA, NAA, IAA, and Seradix L 15 were highly effective in inducing rooting in cuttings of *Lavandula vera*, *Pelargonium graveolens* and *Pogostemon patchouli* grown at elevations ranging from 3200–4200 ft.—Res. Stat. Cinchona Directorate, Mungpoo.

5749. Fernandes Costa, A., and Cardosa do Vale, J.
Observations in the study of Portuguese aromatic plants—essential oil of *Foeniculum vulgare* Mill.
Perfum. essent. Oil Rec., 1959, **50**: 291-6, bibl. 14.

Fennel plants gathered in September contained 0·45%, and fruit picked in October 3·55%, of a practically colourless aromatic oil, which probably contained both camphor and valeric acid but did not contain fenchyl alcohol. Chemical details of the fractions are given.

5750. Nevstrueva, R. I.
Lavandins on the southern coast of the Crimea. [Russian.]
Agrobiologija, 1960, No. 1, p. 147.

Natural hybrids between *Lavandula vera* and *L. spica*.

5751. Paulet, M.
Cultivation of lavandin and lavender in Languedoc.
Perfum. essent. Oil Rec., 1959, **50**: 380-7, illus.

Efforts to eliminate the unwanted constituents of lavandin oil by breeding and selection, and the rapid expansion of the cultivation of this comparatively new aromatic in the south of France are described. Methods of extraction and purification practised in the area are given.

5752. MAESTRE ZAPATA, J., AND GONZALEZ DEL TÁNAGO, J.
Sobre la desterpenación de la esencia de lavanda. **(Removal of terpenes from lavender essence.)**
Farmacognosia, 1959, **19**: 281-4, bibl. 5.

Fractionation by vacuum distillation and composition of French and Spanish lavender oil.

5753. KORNEVA, E. I.
Changes in the qualitative composition of the essential oil in scions of mint. [Russian.]
Agrobiologija, 1960, No. 1, p. 146.

Grafting experiments with 3 kinds of mint have shown that substances specific to the essential oil of the rootstock were synthesized in the leaves of the scion.

5754. SCHROEDER, H.
Der Einfluss von Stickstoff, Phosphorsäure, und Kali auf Ertrag und Gehalt an ätherischem Öl bei Majoran (*Majorana hortensis* Moench). **(The influence of nitrogen, phosphates and potash on the yield and volatile oil content of marjoram (*Origanum vulgare*).)**
Pharmazie, 1959, **14**: 329-46, 408-17, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 27,853.

No definite effect of fertilizers on the volatile oil content could be demonstrated in field experiments. In practical cultivation, therefore, marjoram is best fertilized to produce the maximum yield of herbage. The fertilizer normally recommended for this crop is as follows: N, 80–100; P_2O_5, 36–45; K_2O, 60–80 kg./ha. This recommendation applies to the climatic conditions of central Germany and production on rich loamy soils. To avoid injury during the early growth of the plants only half the N should be applied before sowing and the remainder in small doses as top dressings.—Karl Marx Univ., Leipzig.

5755. ILIEVA, S., AND ZOLOTOVITCH, G.
Research on sweet marjoram (*Majorana hortensis* Mnch) cultivated in Bulgaria and the essential oil produced from it.
Perfum. essent. Oil Rec., 1959, **50**: 300-3, bibl. 6.

Yields of oil from plants grown in the mountains were lower than those from plants cultivated in the plains but quality was similar. The oil accumulated in the leaves and racemes, the latter having the highest content. The quality of Bulgarian sweet marjoram oil was high. Physical characteristics are given of oil from various sources and from plants dried in different ways.

5756. KAPOOR, J. N.
Sandalwood oil industry in India.
Perfum. essent. Oil Rec., 1959, **50**: 388.

Size, distribution and production.

5757. IGNAT'EVA, N. S.
Pharmacognostic studies on tansy. [Russian.]
Idem. II. Phytochemical studies. [Russian.]
Sb. nauč. Rab. Mosk. farmacevt. In-t, 1957, **1**: 187-200 and 201-8, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstrs. 96,182 and 96,183.

The first paper deals with the anatomy of *Tanacetum vulgare* and the second with the accumulation therein of essential oils and tannins. The maximum contents of these compounds were found from the beginning of bud formation to the end of flowering and were highest in the inflorescences and leaves. The stems and roots contained no essential oil and little tannin. The essential oil from the inflorescences contained more esters and thujone at full bloom than at the beginning of flowering. In the leaves the ester content of the oil remained fairly constant, but the content of thujone was highest prior to bud formation and again at full bloom. Harvesting during bud formation, at beginning of flowering or at full bloom is recommended. Storage for 2 months reduced the essential oil content of the inflorescences by 15·6–16·5% and storage for 1 year by 24·4–25·3%.

5758. NIGAM, I. C., DHINGRA, D. R., AND GUPTA, G. N.
Potentiometric estimation of carbonyls in Indian vetiver oils.
Perfum. essent. Oil Rec., 1959, **50**: 297-9, bibl. 6.

Allowing a reaction time of 24 hours at room temperature gives results slightly lower than the method of Zutshi and Sadgopal.

Fibres.

(*See also* 4718.)

5759. COMMONWEALTH ECONOMIC COMMITTEE.
Industrial fibres.
Publ. Commonw. econ. Cttee, 1960, pp. 236, 10s.

Production and trade in fibres, including hemp, sisal, coir and kapok.

5760. BAKER, H. G., AND HARRIS, B. J.
Bat-pollination of the silk-cotton tree, *Ceiba pentandra* (L.) Gaertn. (*Sensu lato*), in Ghana.
J.W. Afr. Sci. Ass., 1959, **5**: 1-9, bibl. 15, illus.

The fruit bats *Epomophorus gambianus*, *Nanonycteris veldkampii* and especially *Eidolon helvum* were observed taking nectar from the flowers of *C. pentandra* at Achimota. *E. gambianus* visited the trees just after dusk and the visits of *N. veldkampii* started when those of the former ceased. Flocks of *E. helvum* appeared to confine their attentions to the kapok trees and are considered to ensure cross-pollination.—Univ. Coll. Ghana.

5761. PONS, J. E.
Cultivation of sisal requires considerable capital outlay.
Fmg S. Afr., 1960, **36**(3): 13-16, illus.

Suitable soils, propagation, cultivation, harvesting, processing and capital requirements of the crop in South Africa.

Hops.

(*See also* 4691, 6297.)

5762. WYE COLLEGE.
Annual Report of the Department of Hop Research from 1st April, 1958 to 31st March, 1959, 1959, pp. 90, 5s.

Plant breeding: The use is reported of polyploid parents, obtained with the aid of colchicine, in a programme designed to produce wilt-tolerant varieties and varieties for lager brewing; resistance to mosaic and downy mildew is being sought in wilt-susceptible varieties with good brewing qualities to breed new varieties for non-wilt areas; the inheritance of resin characters was investigated in plants from 4 seedling families. *Field experimentation:* Early clones showed a strong negative correlation between yield and resin content; in late clones it was not so marked. *Organic chemistry:* The effects of 3 different Cl-substituted phenoxyacetic acids and a (2-chlorophenylthio) propionic acid on plant metabolism and on the incidence of downy mildew are noted. *Entomology:* Dimefox and demeton methyl, in that order, gave better control of aphids and higher yields than derris. *Pathology:* No control of the basal spike form of downy mildew was obtained with spring applications of 1,000 p.p.m streptomycin. Papers on major element deficiencies, soft resins and reducing sugars in relation to N manuring, carbohydrate balance and propagation of hops are abstracted below.

5763. BEARD, F. H.
Notes on unnamed Wye varieties of hops in commercial cultivation.
A.R. Wye Coll. Dep. Hop Res. 1958, 1959, pp. 32-9, bibl. 10.

Seasonal and cropping characteristics, soft resins analysis, disease susceptibility, trade comments and brewing trials described for 4 varieties.

5764. INSTITUTE OF BREWING, HOPS ADVISORY COMMITTEE.
Brewing trials of wilt-tolerant hops for the seasons 1952-1957.
J. Inst. Brew., 1960, **66**: 207-12, bibl. 4.

Of 5 wilt-tolerant varieties tested Density, Defender, Bramling Cross and Janus were found by most brewers to be suitable at a 25% substitution rate in normal hop grists. The α-acid content of Janus was equal to that of the control hops, but the other 3 varieties had higher contents.

5765. MORI, Y.
Hair characters of the hop plant.
Bull. Brew. Sci., Tokyo, 1959, **5**: 13-35, from abstr. in *J. Inst. Brew.*, 1960, **66**: 253.

Hairiness in hop varieties was found to be characteristic of the geographical source and correlated with leaf form.

5766. MORI, Y.
Germination of hop pollen on artificial culture medium.
Bull. Brew. Sci., Tokyo, 1959, **5**: 37-42, from abstr. in *J. Inst. Brew.*, 1960, **66**: 253.

On 1% agar-agar containing 0·4M. sucrose adjusted to pH 5·2 at 30° C.

5767. WILLIAMS, I. H., AND SYKES, J. T.
Hop propagation. II. Soft-wood internodal cuttings.
A.R. Wye Coll. Dep. Hop Res. 1958, 1959, pp. 62-9, bibl. 8, illus.

By using the 2-node type of cutting described, large batches of standard clonal material for research can be obtained from plants grown under glass throughout the year, using artificial illumination to extend the natural winter day length. A propagation unit, 6 ft. 8 in. × 3 ft. can produce 300 cuttings every 2 or 3 weeks. Root promoting chemicals are unnecessary. The use of soil warming and mist techniques, which are described, increased both the number of cuttings successfully regenerating and the rate of rooting. Previous research on the propagation of this type of soft-wood cutting is reviewed. [For part I, see *H.A.*, 29: 658.]

5768. HOED, F., HOED, J., AND SPELEERS, A.
Study of the forcing of hops at the Institut National Belge du Houblon. [French?]
Pet. J. Brasseur, 1960, **68**: 20-2, from abstr. in *J. Inst. Brew.*, 1960, **66**: 169-70.

A hop plant grown in a greenhouse was comparable in vegetative growth to those grown outdoors, but the crop weight was lower, although the cones contained more humulone. In the second year the plant produced 3 crops, the first 2 insignificant, but the total humulone produced was 10% more than that in the field, the increase being entirely in the α-fraction.

5769. WILLIAMS, I. H., AND WESTON, E. W.
Changes in the carbohydrate balance of the hop (*Humulus lupulus L.*).
A.R. Wye Coll. Dep. Hop Res. 1958, 1959, pp. 55-61, bibl. 5.

Plants of the variety Eastwell Golding were grown in pots in an unheated glasshouse until mid-August, when they were moved to a heated house with a minimum temperature of 55° F. One group of plants was treated with a day length of 16 hours using artificial light, and a second group was grown in the naturally shortening days of autumn and early winter. Samples were taken from 5 plants of each group at weekly intervals from August to December. Lengths of shoot and leaf area were measured and the storage organs were analysed for reserve carbohydrates. Results showed that the rate of carbohydrate accumulation is inversely related to the rate of growth of the shoot.

5770. WESTON, E. W.
A note on the relationship between soft resins and reducing sugars in the hop cone as a result of nitrogenous manuring.
A. R. Wye Coll. Dep. Hop Res. 1958, 1959, pp. 51-4, bibl. 5.

When clonal Fuggle N hops were grown at Wye in sand culture at nil, normal and twice normal levels of nitrogen nutrition, the soft resins content of the cones varied inversely with applied nitrogen. The relationship was most marked in the case of the alpha acids. The yield of cones and their percentage content of reducing sugars were greatest at normal rates of nitrogen application. A significant positive correlation was found between the percentage content of alpha acids and of reducing sugars. [Author's summary.]

5771. THOMPSON, F. C.
Some observations on major element deficiencies in hops under field conditions.
A. R. Wye Coll. Dep. Hop Res. 1958, 1959, pp. 40-9, bibl. 4.

In a field trial planted in 1947 on soil which was very deficient in available nutrients the rates of application of fertilizer to treated plots during a study of P, K and Mg deficiencies were P_2O_5 at 250 lb./acre, K_2O at 300 lb./acre and Mg at 100 lb./acre. Deficiency plots did not receive the appropriate fertilizer, but all plots received a N dressing of 300 lb./acre. Leaf chlorosis and scorch, both symptoms of Mg deficiency, were widespread in the first 2 years, but afterwards showed up only in the Mg-deficient plots. Initially the hops grew strongly, showing no other visible symptoms of deficiency, but in 1951 symptoms of K deficiency appeared on the "no-potash" plots, and from 1956 onwards deficiency symptoms appeared on the "no-phosphate" plots. Deficiency symptoms occurred after the plant had made its main flush of vegetative growth at the end of June or beginning of July. Leaf analysis showed that applied P increased leaf contents of P but not those of K or Mg; applied K increased leaf contents of K considerably and depressed the Mg content; and applied Mg increased the Mg content of the leaf even in the presence of K. Heavier applications of P did not result in greater uptake of P, but K applications resulted in a marked increase in K uptake, particularly in the later years. Soil analyses and deficiency symptoms in the hops are described in detail.

5772. WATSON, G. A.
The effect of soil pH and manganese toxicity upon the growth and mineral composition of the hop plant.
J. hort. Sci., 1960, **35**: 136-45, bibl. 18.

The effect of soil pH on hop growth was investigated at Wye College in a soil-culture experiment under conditions of low and normal NPK nutrition, and with 3 types of soil at 4 levels of pH ranging from 4·5 to 7·5. With normal nutrition growth and vigour appeared to be little affected by soil type or pH within the range covered by the trial. With low nutrition growth and vigour were reduced by Mn toxicity at pH 4·5, but were more satisfactory at higher levels of pH. The effects of high levels of applied Mn and Al were investigated at low and high levels of NPKMg nutrition in a sand-culture experiment with 3 levels of applied Ca. Symptoms of Mn and Al toxicity were produced and are described. Mn toxicity was reduced at high levels of nutrition and of applied Al. The latter appeared to modify the Mn toxicity symptoms by inducing P deficiency. Visual symptoms of Mn toxicity were accompanied by the development of high contents of N, P and K in the leaf. In cases of severe toxicity a leaf chlorosis suggestive of Fe deficiency was observed; this chlorosis was, however, associated with an increase in the total Fe content of the leaf. In both soil- and sand-culture experiments, leaf contents of Ca and K showed mutual replacement, the proportion of Mg being little affected. [Author's summary.]

5773. KARABANOV, Ju. V.
The effect of manganese on the dynamics and content of glutathione in hops. [Ukrainian, with Russian and English summaries 7 lines each.]
Dopov. Akad. Nauk UkrRSR, 1959, No. 10, pp. 1162-5, bibl. 8.

The highest content of glutathione occurs in the leaves of hops during flowering. The content of hydroascorbic acid is in direct proportion to the glutathione content. Manganese increases the contents of glutathione and hydroascorbic acid, and may also increase the yield of cones. [See also *H.A.*, 28: 2813.]

5774. MAIER, C. R.
Streptomycin absorption, translocation, and retention in hops.
Phytopathology, 1960, **50**: 351-6, bibl. 7.

See *H.A.*, 28: 649p, and 29: 3828.

5775. MAIER, C. R.
Effects of streptomycin sulfate on the hop-downy mildew fungus *in vivo*.
From abstr. in *Phytopathology*, 1959, **49**: 545.

Streptomycin appeared to alter the reproductive structure of the fungus. [See also *H.A.*, 29: 3828.]

5776. Ogawa, J. M., McCain, A. H., and Hall, D. H.
Streptomycin absorption in diseased and healthy hop tissues and its effect on the hop downy mildew organism and mildew development.
Phytopathology, 1960, **50**: 278-80, bibl. 4, illus.

A spray application of streptomycin at 1,000 p.p.m. to hops resulted in concentrations of 200 p.p.m. in the leaves and 40 p.p.m. in the stems of plants infected with downy mildew, and 100 p.p.m. in the leaves and 10 p.p.m. in the stems of healthy plants. Diseased shoots maintained higher concentrations of streptomycin than healthy shoots. Systemic infections of downy mildew were not eliminated by the spray, nor were sporangia inactivated. A concentration of 9–43 p.p.m. in washed, healthy leaves did not prevent infection, but sprayed unwashed leaves were protected to some extent. Streptomycin caused chlorosis of the leaves, the degree of chlorosis being proportional to the amount of streptomycin in the leaf tissue.—Univ. Calif., Davis.

5777. Davis, E. L.
Visual analysis of hop samples. [French, German and Spanish summaries ¼ p. each].
Wallerstein Lab. Commun., 1960, **23**: 19-25, bibl. 7, illus.

The degree of condensation or expansion of the cone axis, its angularity, the type of bract scar and the number of veins in the bract were used to divide hop varieties into 3 groups, which were further characterized by low, high or intermediate values for cohumulone in their α-acids.—Univ. Mass., Amherst.

5778. Gimbel, L. S., 3rd, Schwartz, B. W., and Owades, J. L.
Study of lead precipitation and spectrophotometric methods of hop analysis.
Proc. Amer. Soc. Brew. Chem., 1959, pp. 32-40, from abstr. in *Wallerstein Lab. Commun.*, 1960, **23**: 49.

The spectrophotometric method gave significantly higher results for α-acids, particularly when toluene was used for extraction.

5779. Bausch, H., Walter, H., and Sommer, D.
Beitrag zur chromatographisch-polarimetrischen Schnellbestimmung des Gehalts der Hopfenzapfen an α-Bittersäuren. **(Contribution to the chromatographic polarimetric rapid method of determining α-acids in hops.)**
Nahrung, 1959, **3**: 501-14, from abstrs in *Wallerstein Lab. Commun.*, 1960, **23**: 49, and in *J. Inst. Brew.*, 1960, **66**: 170-1.

Recommends replacement of the SO_2-saturated ether in the Verzele method by ethyl acetate.

Insecticidal plants.

(*See* 6083, 6300, 6314, 6328, 6332.)

Rubber plants.

(*See also* 4714, 4725.)

5780. Dorado Bernal, E.
Características del caucho de guayule (*Parthenium argentatum* Gray). **(Characteristics of the rubber from guayule (*Parthenium argentatum*).)**
Farmacognosia, 1959, **19**: 285-311, bibl. 15, illus.

Histochemical methods have replaced chemical analysis of the tissues for locating latex in the plant. The distribution of resins and latex in the wood and cortex in various parts of the plant is shown quantitatively. The physical properties, chemical composition, ageing and vulcanization are described, and methods of overcoming the disadvantages of the high resin content are compared. [See also *H.A.*, 30: 2527.]

5781. Marzocca, A.
Cultivo y mejoramiento de *Taraxacum kok-saghyz*. **(The cultivation and selection of *Taraxacum kok-saghyz*.)**
Idia, 1960, No. 149, pp. 17-37, bibl. 9, illus.

A summary of investigations from 1951 to 1959 at Castelar, Buenos Aires.

Seed oils.

(*See also* 4703, 4704, 5318, 5653, 6008, 6083, 6322, 6328.)

5782. Jones, Q., and Wolff, I. A.
The search for new industrial crops.
Econ. Bot., 1960, **14**: 56-68, bibl. 8, illus.

Including several promising new oilseed species, viz. *Dimorphotheca aurantiaca*, *Momordica balsamina*, *Rudbeckia bicolor* and *Chrysanthemum coronarium*.

5783. Atsmon, D.
A lethal gene in the castor bean plant.
J. Heredity, 1959, **50**: 302-4, bibl. 15, illus.

A mutation causing shrunken cotyledons and death in the seedling stage.

5784. Neal, G. E., and Beevers, H.
Pyruvate utilization in castor-bean endosperm and other tissues.
Biochem. J., 1960, **74**: 409-16, bibl. 12.

In castor-bean endosperm and petiole and in *Bryophyllum* leaf.

5785. Pontovič, V. É., and Karimov, H.
Variation in the amino acid content of fruits of the oil poppy. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1960, **7**: 151-9, bibl. 36, illus.

The amine nitrogen content was highest in the seeds and placenta of the young fruit; it then decreased, particularly in the seeds, during development, and finally rose again, especially in the placenta, on ripening. The protein content of the seeds rose from 18 to 28%. The amino acids in the fruit and leaf proteins were similar, but different free amino acids were found in the fruits and leaves. The latter included γ-amino butyric-acid and β-alanine, which is considered to be directly involved in oil production.

5786. Maas Geesteranus, H. P.
Een geval van noodrijpheid bij blauwmaanzaad. **(A premature ripening of seed poppies.)** [English summary 9 lines.]
Tijdschr. PlZiekt., 1960, **66**: 107-10, illus.

The cause was investigated of the premature death of seed poppies at the end of the vegetative period. One spray application of Systox before flowering reduced the incidence of the disorder and increased the yield of seed. This result suggests that the disorder may have been due either to infection by the sugar beet yellows virus or to aphid damage.—Inst. PlZiekt. Onderz., Wageningen.

5787. Beech, D. F.
Safflower—an oil crop for the Kimberleys.
J. Agric. W. Aust., 1960, **1**: 181-7, illus.

Advice on growing the crop under irrigation, using about 2½ acre feet of water.

5788. (Thomas, C. A.)
More root rot resistance [in safflower].
Agric. Res. Wash., 1960, **8**(11): 15.

US-10 is almost identical to Nebraska-10 but is *Phytophthora*-resistant.

5789. Seshadri, T. R., and Thakur, R. S.
The colouring matter of the flowers of *Carthamus tinctorius*.
Curr. Sci., 1960, **29**: 54-5, bibl. 8.

It is suggested that the main component of safflower flowers, 6-glucosidoxy-2:4:4:5-tetrahydroxychalkone, should be called carthamin and the red quinone dye, which is an oxidation product of the above, should be called carthamone.—Delhi Univ.

5790. Knoepfler, N. B., and others.
Comparison of six solvents for extraction of jojoba seed.
J. Amer. Oil Chem. Soc., 1959, **36**: 644-8, bibl. 23, from abstr. in *J. appl. Chem.*, 1960, **10**: i-514.

Simmondsia californica.

Tannin plants.

(*See also* 4639, 5757.)

5791. Pervuhin, F. S.
New tannin plants. [Russian.]
Vestn. s.-h. Nauki, 1960, **5**(4): 121-3, bibl. 12.

One of the more promising plants is *Bergenia crassifolia*, which occurs naturally and is also cultivated for its high tannin content (about 20% of dry weight). It is propagated either by seed or pieces of rhizome and the tops are mown, at intervals of 1, 2 or 3 years, and used for tannin extraction. The plant is long lived and can be cropped for 20 years. On fertilized soils higher tannin yields were obtained by planting in bands 1 m. wide set 50 cm. apart and mowing annually than by planting at wider spacing and mowing less frequently.

5792. Kaz'mina, L. P.
Pharmacognostic studies on *Bidens tripartitus* L. Part I. [Russian.]
Sb. nauč. Rab. Mosk. farmacevt. In-t, 1957, **1**: 209-14, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,186.

The content of tannins in *B. tripartitus* was highest during flowering (6·46%) and the ratio of polyphenols to total tannins was greatest prior to bud formation (61·7%). The carotene content in the apices reached a maximum during flowering (50·2 mg.%). During 1 year's storage under dry conditions at 18–20° C. the tannins and polyphenols were little affected; drying at 60° C. resulted in satisfactory preservation of the carotene.

Sugar maples.

(*See also* 5913.)

5793. Jones, A. R. C.
Revolution in the sugar bush.
Macdonald Fm J., 1960, **21**(3): 6-7, illus.

Notes on the use and advantages of plastic materials for maple sap collection and the use of sterilizing agents in the tap hole.

FLORICULTURE

General.

(*See also* 4652, 4677, 4692, 4701, 4723, 5258, 6279, 6320.)

5794. CHRISTIE, W. D.
Indoor planting areas.
[*Publ.*] *B.C. Dep. Agric., hort. Branch*, 1959, pp. 5.

A list of indoor ornamentals classified according to their light needs, with hints on culture.

5795. FRISBIE, L. F.
Plastic-tent propagation of deciduous cuttings.
Gdnrs' Chron., 1960, **147**: 266, 278.

A method used in Washington State is described. Moist rooting medium should be placed on top of a plastic lining to retain moisture. Softwood cuttings, 3 in. long and treated with hormone rooting powder, rooted successfully if inserted to 1–1½ in. The polythene cover should be screened from direct sunlight to avoid burning. Azaleas and many other ornamentals can be successfully propagated in this way; rhododendrons may require bottom heat.

5796. COORTS, G. D.
Excess manganese nutrition of ornamental plants.
Res. Bull. Mo. agric. Exp. Stat. **669**, 1958, pp. 35, bibl. 44, illus.

Symptoms of Mn toxicity in a number of ornamental plants are described. Calendula, chrysanthemum and snapdragon appear to be very sensitive to high Mn concentrations in the substrate, and calendula and snapdragon are recommended for use as indicator or test plants. Manganese decreased plant growth when present in excess in solution cultures, which were deficient in single nutrients, with the exception of Mg. This was attributed to the partial replacement of Mg by Mn in certain enzyme systems. Concentrations of Mg and Fe in plant tissue decreased when Mn was added to plants grown in nutrient solutions deficient in these elements. The best plant growth was obtained with an Fe : Mn ratio of 1 : 5. The addition of Fe to plants grown in soil with a high Mn content increased growth, and low concentrations of chelated Fe (1p.p.m.) were better than high in counteracting Mn toxicity in solution culture. The application of Ca did not prevent Mn toxicity occurring in soils.

5797. BROWN, E. B.
Recent work on eelworm attack on flower crops.
Exp. Hort., 1960, No. 3, pp. 71-2, bibl. 4.

Damage caused by various nematodes is described. Populations of *Meloidogyne hapla* can be reduced to a very low level by growing cereals for one year and keeping the land weed free or by fumigating with DD at 300–400 lb./acre.

5798. MINISTRY OF AGRICULTURE, LONDON.
Brown scale.
Adv. Leafl. Minist. Agric. Lond. **88**, revised 1959, pp. 2, illus.

Damage by, life history and control of, *Eulecanium corni* on ornamentals and fruit trees and bushes.

5799. GAUD, S. M.
Control of greenhouse thrips, *Heliothrips haemorrhoidalis* Bouché, with systemic insecticides. [Spanish summary ¼ p.]
J. Agric. Univ. P. R., 1959, **43**: 291-4, bibl. 5, illus.

The insect and the damage caused by it are described. Three new hosts recorded are "brillantina" (*Iresine lindenii*), croton (*Codiaeum variegatum*), and "capa de obispo" (*Acalypha wilkesiana*). Control was obtained on crotons for 2 months with Thimet, Systox and Bayer 23129 at concentrations of 1 : 400, 1 : 600 and 1 : 800. Bayer 19639 at 1 : 800 gave control for 1 month only.

5800. SCHEER, C. D.
Ontwikkeling van teelt, handel en verbruik van bloemen in West-Duitsland. (**Trends in the production, trade and utilization of flowers in West Germany).**
Meded. Dir. Tuinb., Suppl., Sept. 1959, pp. 29, illus.

A survey, with reference to the effect of the German trade in cut flowers and pot plants on Dutch exports.

5801. MOORE, E. J.
Floral marketing by wholesale growers in New York and Chicago.
Mktg Res. Rep. U.S. Dep. Agric. **323**, 1959, pp. 44.

Marketing methods, policies, services and costs; volume of sales and gross returns per sq. ft. of greenhouse area.

5802. RÍOS, J. M., AND OTHERS.
El mercadeo de flores y plantas ornamentales en Puerto Rico. (**Marketing flowers and ornamental plants in Puerto Rico.**) [English summary 1 p.]
Bol. Estac. exp. agric. P.R. **146**, 1959, pp. 38, illus.

The economic problems and practices of producers and florists handling roses, white lilies, marguerite daisies and foliage plants.

Annual and herbaceous plants.

(*See also* 4672, 4682, 4702, 4704, 4708, 4724, 4725, 4749, 4753, 4755, 4793, 4808, 5471, 5707, 5782, 5796, 5802, 5860, 6318, 6319, 6324.)

5803. BOODLEY, J. W.
Progress report on growing pot plants and bedding plants in artificial media.
Bull. N.Y. St. Flower Grs, 1960, No. 170, pp. 1-4.

African violets, *Begonia semperflorens*, chrysanthemums, geraniums, impatiens and petunias were grown in 16 different media, composed of fine or coarse quartz sands and medium fine coarse grade perlite mixed in various proportions with German peat moss. The plants were fed with equal amounts of a fertilizer mixture on a weekly or fortnightly basis. No single growing medium was best for all the crops grown. Petunias produced excellent growth in any of the media in which at least 50% peat moss was used. The addition of the fertilizer components prior to planting is considered to be an important factor for successful crop production in artificial media.

5804. Jauhari, O. S., and Jit, A.
A note of the effect of maleic hydrazide on growth and flowering of aster (*Callistephus chinensis*).
Sci. and Cult., 1960, **25**: 697-8, bibl. 2.

A drench spray of MH at 500 p.p.m. increased the average number of lateral shoots and flowers per plant, while reducing the final height and delaying blossoming. Higher concentrations (1,000–2,000 p.p.m.) markedly reduced height, number of laterals and flowers and also delayed blossoming.—Govt. agric. Coll., Kanpur.

5805. Lockie, G. D.
Close planting adds £10,000 per acre in three years.
Grower, 1960, **54**: 177-9.

Glasshouse spacing of Sim carnation varieties at 6 × 5 in. has increased profits by comparison with 6 × 9 in. spacing at Fernhurst (Plant Protection Ltd.).

5806. Bing, A.
Timing your carnation crop.
Bull. N.Y. St. Flower Grs, 1960, No. 172, pp. 1-2, 4, bibl. 5.

Rooted cuttings of White Sim carnations were planted and immediately pinched in each of 12 consecutive months, the yield for the following 18 months being noted. The January planting yielded well in June but poorly during the following winter. The April planting yielded well in July but also gave poor yields in the following winter. The July planting gave good yields in October and November but low yields from December to March. The August planting yielded well during the winter months.

5807. Pokorny, F. A.
Photoperiodic control of growth and flowering of carnations.
Diss. Abstr., 1960, **20**: 3005-6, being *L.C. Card No. Mic.* 60-227 of 196 pp.
Effect of photoperiod on carnation flowering.
Flor. Exch., 1960, **134**(17): 42-3,

Stock plants of the carnation variety Sidney Littlefield were grown under 8- and 16-hour photoperiods. Tip cuttings from these were propagated under mist with 8- and 16-hour photoperiods, and the rooted cuttings representing 4 photoperiodic treatment combinations were grown to flowering again under 8- and 16-hour photoperiods. The long-day stock plants produced cuttings continuously but in relatively small numbers at any one time, whereas the short-day stock plants produced large numbers of cuttings on certain dates but at longer intervals. Cuttings from the short-day stocks rooted significantly better than those from the long-day stocks. Cuttings propagated under long days rooted better than those under short days. The effects were cumulative; thus optimum rooting was obtained with cuttings from short-day stock rooted under long days. Plants from short-day stock grown to flowering under long days flowered the earliest and produced the most saleable flowers per unit area. Photoperiodic treatment during propagation had no significant influence on flower production. The longest stems, sometimes too long, were produced by plants grown to flowering under short days. The largest and heaviest flowers were also produced under short photoperiods. Treatments during the 2 earlier growth stages had no significant influence either on stem length or on the size or weight of the flowers.—Univ. Ill.

5808. (White, H. E.)
Carnation daylength affects mineral uptake.
Flor. Exch., 1960, **134**(17): 57

The uptake of nutrient elements by plants grown under normal and long-day conditions was relatively high during the early stages of plant growth and declined as the flowering stage was reached, but the nutrient element levels were consistently lower in the long-day plants.—Univ. Mass.

5809. Peterson, R.
Calcium hunger in carnations.
Bull. Colo. Flower Grs' Ass., reprinted in *Flor. Exch.*, 1960, **134**(17): 58.

Deficiency symptoms are described. During trials, in which plants grown in volcanic scoria received no Ca, it was found that 13% fewer flowers were produced with a 12% reduction in the weight/length ratio. Stem length was not affected, but there were many "sleepy" flowers (not opening properly) and consistent foliage scorch.—Colo. St. Univ.

5810. Schindler, A. F., Stewart, R. N., and Semeniuk, P.
A *Fusarium*-nematode complex in carnations.
From abstr. in *Phytopathology*, 1959, **49**: 550.

In greenhouse experiments established carnation plants were inoculated with *Fusarium oxysporum* f. *dianthi* 1 week, 2 months and 5 months after inoculation with any one of 6 species of root-knot nematodes. These plants showed a significantly higher incidence of fusarial wilt than plants whose roots were exposed to either the *Fusarium* or the nematode inoculum alone. Mechanical wounding of the roots increased the rate of wilting in the presence of *F. oxysporum* but had no effect in its absence.

5811. Nelson, P. E., Tammen, J., and Baker, R.
Control of vascular wilt diseases of carnation by culture-indexing.
Phytopathology, 1960, **50**: 356-60, bibl. 41, illus.
Nelson, P. E., and Tammen, J.
Control of carnation wilt diseases.
Bull. N.Y. St. Flower Grs, 1960, No. 173, pp. 1-4, bibl. 6, illus.

The effectiveness of Hellmers' broth method for detecting carnation cuttings infected with *Fusarium oxysporum* f. *dianthi* and *Pseudomonas caryophylli* was determined by culture-indexing tip cuttings from plants growing in commercial greenhouses in New York, Pennsylvania and Colorado, establishing apparently pathogen-free cuttings as single units in commercial nucleus blocks, and observing them for symptoms for 14 months. About 40% of the original plants from which cuttings were taken showed symptoms of the 2 diseases. Of the 3,564 cuttings indexed, 0·4% yielded the pathogens. Of the 2,121 cuttings established as single units in nucleus blocks, 10 exhibited vascular wilt symptoms during the 14 month period. Three (0·14%) of these yielded *F. oxysporum* f. *dianthi*, 4 (0·19%) *P. caryophylli* and 3 no pathogen. It is concluded that careful selection will eliminate the major portion of infected cuttings, that Hellmers' broth method did not allow for 100% detection of the 2 pathogens in infected cuttings not eliminated by selection, and that the establishment of selected or culture-indexed plants as single units in nucleus blocks is essential for pathogen-free production of this crop. [From authors' summary to first paper.]—Cornell, Pa St. and Colo. St. Univs.

5812. U.S. Department of Agriculture.
Growing chrysanthemums in the home garden.
Home Gdn Bull. U.S. Dep. Agric. **65**, 1959, pp. 8, illus.

Advice on types, culture, propagation and disease control.

5813. Kohli, S. P., and Kaicker, U. S.
Structural hybridity in *Chrysanthemum carinatum* Schousb.
Indian J. Hort., 1959, **16**: 108-9, illus.

Cytological studies.

5814. Sheehan, T. J., and Sagawa, Y.
Many variations are found in irradiated mums.
Sunshine St. agric. Publ., October, 1959, reprinted in *Flor. Exch.*, 1960, **134**(19): 15.

Doses of 0 to 33,840 r were applied in the Florida Experiment Station's Cobalt-60 Unit for 4 hours to rooted cuttings of a 9-week lavender-pink variety of *Chrysanthemum morifolium*, Bluechip, which were then planted in the field. After supplementary light treatment they flowered in late May. Doses above 7,520 r proved lethal, whereas doses from 3,996 r to 7,520 r produced additional growth but few flowers. Plants treated at 2,040–3,996 r developed normally, but produced over 100 flower heads with colour mutants. Colours included off-white, white, yellow, bronze, apricot and light lavender, all of which have appeared in F_2 populations.

5815. Wilson, M. H., and Dovaston, H. F.
Early flowering chrysanthemum varieties in Scotland. Report for 1957-1959.
Res. Bull. W. Scot. agric. Coll. **26**, 1960, pp. 17.

A continuation of the earlier trials reported in *H.A.*, 27: 686 and 28: 679, giving tabular data and notes on 137 varieties grown in the open and on 26 varieties grown under Dutch lights.

5816. von Hentig, W.-U.
Untersuchungen über den Einfluss der Ernährung von Chrysanthemen- und Fuchsienmutterpflanzen auf die Stecklingsproduktion und -bewurzelung. (**Studies on the influence of the nutrition of chrysanthemum and fuchsia parent plants on the production and rooting of cuttings.**) [English and French summaries $\frac{3}{4}$ p. each.]
Gartenbauwiss., 1959, **24**: 334-62, bibl. 26.

The effect of nutrition on the production of cuttings by chrysanthemums and fuchsias was studied in gravel culture, sand culture and standard soil, two varieties of each species being used. The main findings were: (1) Changes in the nutrient ratio affected the growth of the parent plants, the production of cuttings, the time needed for root formation, the number of adventitious roots per cutting and their length. (2) Changes in the ratio of N and K had a greater effect on the results than changes in P. (3) With *Chrysanthemum indicum* good results were obtained by changing the nutrient ratio hitherto considered correct [see *H.A.*, 23: 4415] in favour of more N or less K; either N deficiency or excess K had a bad effect. An increase in P associated with an increase in N also produced satisfactory results, but an increase in P by itself proved unfavourable. (4) With *Fuchsia speciosa* good results were obtained by retaining Penningfeld's nutrient ratio [*H.A.*, 23: 4415] or by at most doubling the proportion of N. Trebling the proportion of N improved the production of cuttings, but not their rooting. Any other deviation from the standard nutrient ratio, especially an increase in K, had a bad effect.—Inst. ZierpflBau., tech. Hochsch., Hannover.

5817. Newton, P.
Soil consolidation and the chrysanthemum.
Gdnrs' Chron., 1960, **147**: 268, 278, bibl. 5.

Plants of 4 varieties were potted in the same amount of soil either compacted or left loose to investigate the effects on bloom quality. In all varieties the blooms on the plants in loose soil were more advanced, but only in Frances Harris were differences in quality noted. In this variety (classified as incurving) compacted soil produced incurved blooms, while plants in loose soil had reflex blooms. Bloom and floret size and weight were not affected. —Bot. Dep., Univ. Manchester.

5818. Payne, R. N., and others.
Grow quality show mums with minimum labour. Ten-day delayed pinch, no disbudding, proven satisfactory.
Flor. Exch., 1960, **134**(19): 14, 43.

The amount of fertilizer applied and the time spent on watering 16 plants each of 16 varieties grown (1) in plastic pots, (2) in clay pots and (3) in clay pots plunged to the rim in soil, were noted. N, P, K and lime were added to the soil when tests showed that it was necessary. Half the plants were grown on a 10-day delayed pinch schedule and the remaining half on a modified 2-pinch or tip-pinch schedule. No great differences were noted in the amount of fertilizer and length of watering time required. The 10-day delayed pinch method produced showy plants of good quality and involved less labour than the tip-pinching method.—Okla agric. Exp. Stat.

5819. Lange, P.
Ein Mittel zur Erzielung niedrigen Pflanzenwuchses. **(A chemical to reduce plant growth.)**
Gartenwelt, 1960, **60**: 131-2, illus.

Three to five applications of Amo 1618 at 1 : 1,000 reduced the height of chrysanthemum plants without affecting the size of their flowers appreciably. Flowering was not delayed by the treatment. The present price of the chemical precludes its use by growers.—Inst. ZierpflBau, Staatl. Lehr- u. ForschAnst. f. Gartenb., Weihenstephan.

5820. Mastalerz, J. W.
Chemicals added to soil shorten greenhouse plants.
Science for the Farmer, 1960 **7**(4): 7, illus.

The height of potted chrysanthemums was reduced in proportion to the amount of a growth-inhibiting phosphonium compound ($2\frac{1}{2}$–10 g. of Phosfon-D per bushel of soil) mixed into the soil prior to planting. No difference was noted in flower and leaf size of the treated plants, but flowering was delayed for up to 2 weeks. Severe damage may be caused by foliar application.

5821. Kazarjan, V. O., Avundžjan, E. S., and Karapetjan, K. A.
Quantitative changes in the free amino acids in different organs of chrysanthemums at different stages of development. [Russian, with Armenian summary $\frac{1}{2}$ p.]
Dokl. Akad. Nauk. ArmSSR, 1959, **29**(3): 137-40, bibl. 10, illus.

In experiments with the chrysanthemum variety Monaco it was shown by chromatographic analysis that only small differences occur between the amino acids present in the roots, stems and leaves, though the number of amino acids present in the roots is somewhat lower than in the other organs. During flowering the number of amino acids in the plants increases markedly. In the petals and the receptacle 25 amino acids have been identified as well as other unknown compounds. This increase in amino acids is considered to be the main factor associated with the transition of the plant from the vegetative to the generative stage.

5822. Woltz, S. S., and Jackson, C. R.
Yellow strapleaf disease of mums appears in warm weather.
Flor. Exch., 1960, **134**(17): 30-1, 34.

Symptoms and causes of yellow strapleaf (YSL) are discussed. Infected plants were found to have a higher amino acid content than normal, and treatment with isoleucine produced symptoms of YSL. The application of 9g. per 6 in. pot of an equal mixture by volume of feather tankage, sewage sludge, slaughterhouse tankage and castor pomace prevented YSL. Applications of 3 g. copper sulphate and 6 g. superphosphate per pot or a pre-planting treatment of YSL soil with sodium hypochlorite also prevented the disease. Tobacco plants grown with the chrysanthemums reacted similarly with frenching symptoms, and the two diseases may have a similar cause. [For earlier work see *H.A.*, 29: 1675.]—Gulf Coast Exp. Stat., Bradenton, Fla.

5823. Waddell, H. T.
Parasitism of *Septoria obesa* Syd. and *S. chrysanthemella* Sacc. on the cultivated chrysanthemum.
Diss. Abstr., 1960, **20**: 2482, being *L.C. Card No. Mic.* 59-6113 of 90 pp.

Susceptibility of 22 varieties tested and climatic conditions favouring attack investigated.

5824. Tammen, J.
Stemphylium* ray speck of *Chrysanthemum morifolium.
From abstr. in *Phytopathology*, 1959, **49**: 552.

Optimum temperature for development of the disease was 27° C. At 30° C. development was sharply reduced, and at 2° C. and 35° C. no symptoms developed. Susceptible varieties include Beauregard, Forty Niner, Encore, Gold Ball and Orange White Top.

5825. Bindra, O. S.
The control of chrysanthemum aphid.
Indian J. Hort., 1959, **16**: 186.

Metasystox at 0·1% or parathion at 0·05% were the most effective agents against *Macrosiphoniella sanborni*, the former giving 100% kill in 24 hours with no effect on the adult ladybird beetles present. —Dep. Agric., Madhya Pradesh.

5826. Williams, W. B., III, and Box, C. O.
Mature flowers better buy in chrysanthemums.
Miss. Fm Res., 1959, **22**(11): 7, illus.

Under the poor light conditions prevailing in the average flower shop potted chrysanthemums with their flowers three-quarters or fully open had a display life of 10–12 days compared with only 5–7 days for plants with buds partly or half open.

5827. Shozaki, T.
Studies on artificial polyploid plants of *Centaurea cyanus* L. II. Effects of low temperature and long-day treatment on the artificial tetraploid cornflower. [Japanese, with English summary.]
Agric. Bull. Saga Univ., 1957, **6**: 61-9, illus., from *Biol. Abstr.*, *Sect. D*, 1959, **33**, Abstr. 46,759.

The seeds of tetraploid and diploid plants were stored under cold conditions for 7, 14 and 21 days in 1953, and for 10, 20 and 30 days in 1954. Plants were treated with 18-hour photoperiods for 15 or 30 days in 1955 and for 7 or 15 days in 1956, and then returned to natural day length. Elongation of internodes and flowering in both tetraploid and diploid plants were promoted by the low-temperature treatment. The tetraploid and diploid plants which were treated with low temperature showed similar tendencies in growth promotion, but the difference between the tetraploid and diploid plants in sensitivity to vernalization was not clear. There was no difference in the position of the flag leaf or in flowering time following treatment for 15 and 30 days. Hence 15-day treatments are sufficient to promote flowering in both tetraploid and diploid plants.

5828. Nilsson, L.
Fläcksot på bellis. (***Entyloma bellidis* on *Bellis perennis*.**)
Växtskyddsnotiser, 1959, **23**: 67-8, illus.

A description of the fungus and of the symptoms it causes.

5829. Zoerb, J. G.
A new slant on geranium cutting production.
Minn. St. Flor. Bull., 1959, August 1, reprinted in *Ill. St. Flor. Ass. Bull.*, 1960, No. 201, p. 4, illus.

Cuttings to provide stock plants are planted in sterilized soil 12 × 12 in. apart in a bench bed during the first week in June. On each plant 1 shoot is allowed to develop without pinching and side shoots are pinched out to 3 leaves or nodes. The pinching out process is repeated, producing many side shoots as 2 develop at each pinch, and the plant will be about 4 ft. tall by 1 October. The largest and oldest leaves are removed to allow more light and air to penetrate. Cuttings are taken from October to mid-March. With constant fertilizing with a 25–10–10 mixture this method may produce at least 45 to 50 cuttings per sq. ft.

5830. Garthwaite, J. M.
Gerbera propagation.
Exp. Hort., 1960, No. 3, pp. 65-8, bibl. 2.

Artificial pollination is necessary if seeds are required. In this way about 50 seeds per head may be obtained, and if these are sown immediately after harvesting in July 90% germination results. Root and stem cuttings were unsuccessful. Division of crowns was moderately successful when the new sections were planted in a propagating case with electrical soil warming to 70° F. Many of the new plants were infected, however, with *Botrytis*. [See also *H.A.*, 30: 997.]—Luddington exp. Hort. Stat.

5831. Palilov, A. I., Mušinskaja, L. G., and Demidova, G. F.
The hybridization of lupins by pollinating unemasculated flowers. [Russian.]
Selekcija i Semenovodstvo, 1959, **24**(3): 69-71.

Artificial cross-pollination of 2 varieties studied at different stages of flower development.

5832. Klesser, P. J.
Virus diseases of lupins.
Bothalia, 1960, **7**: 207-31, bibl. 11, illus.

Symptoms of 5 viruses on *Lupinus* and other susceptible species.

5833. Seeley, J. G.
Petunias for sale 8 weeks after potting.
Bull. N.Y. St. Flower Grs, 1960, No. 170, pp. 1, 5-7, illus.

Plants of 5 petunia varieties kept at 60° F. night temperature flowered earlier than those kept at 50° F. Plunging in moist sand to obtain a continuous moisture supply caused earlier flowering, but the plants tended to be too tall, except those of the variety Popcorn. Proper spacing prevented the plants growing too tall. Growth and flowering were accelerated by treatment with 4 hours of incandescent light per night, but causing the plants to become pot-bound by planting them in small pots did not induce earlier flowering.

5834. (Piringer, A. A., and Cathey, H. M.)
Petunia Ballerina growth, flowering. Effects of temperatures, daylength.
Flor. Exch., 1960, **134**(17): 43.

See *H.A.*, 29: 3873.

5835. Jusufov, A. G.
The problem of using leaf cuttings to obtain planting material. [Russian.]
Bjull. nauč.-tehn. Inf. Dagest. n.-i. In-ta, S. H., 1957, No. 1, pp. 15-17, from *Ref. Ž.* (*Biol.*), 1958, No. 22, Abstr. 100,532.

Treatment of leaf cuttings of *Phlox paniculata* with 0·06% heteroauxin improved rooting but not shoot formation. The removal of the leaf blade from rooted cuttings, however, accelerated bud and shoot formation and the blade could be used as a further cutting, which rooted more rapidly than the original. Cuttings taken from other plants in bud flowered earlier than those taken before flower bud formation. [See also *H.A.*, 29: 3875.]

5836. Richardson, M. M.
The chromosome numbers of some species and hybrids in the Candelabra section of the genus *Primula*.
Reprint from *Proc. Univ. Durham phil. Soc.*, [1958?], **8**: 272-9, bibl. 13, illus.

5837. v. Hentig, W.-U.
Die Anwendung von Gibberellin bei *Primula obconica*. (**The application of gibberellin to *Primula obconica*.**)
Gartenwelt, 1960, **60**: 142-4, bibl. 4, illus.

The application of the GA preparation Gibboe during the pre-blossom stage in November caused *Primula obconica* plants to develop their buds and flowers more rapidly and more uniformly. The treatment was responsible for a gain in time of 7–14 days or alternatively for an increase in price if the plants were sold at the usual time.—Inst. ZierpflBau, tech. Univ. Berlin.

5838. Jung, J., and Plempel, M.
Über die Hemmwirkung des Gynäzeums bei *Primula obconica* auf Bakterien und Pilze. II. Versuche zur chemischen Isolierung der Narbenhemmstoffe. (**The inhibitory action of the gynaeceum of *Primula obconica* on bacteria and fungi. II. Investigations on the chemical isolation of the inhibiting substances in the stigma.**) [English summary 8 lines.]
Phytopath. Z., 1960, **38**: 245-9, bibl. 4.

Part I was noted in *H.A.*, 29: 1785m.

5839. Nearpass, D. C.
A simple, effective and economical colchicine treatment.
Afr. Violet Mag., 1957, **11**(2): 26-7, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 46,753.

Treatment of African violets is satisfactorily accomplished by using callused leaves and applying one drop of 0·25% colchicine solution to the base of the petiole, returning the leaf to its water rooting medium after 4–6 hours of exposure.

5840. Hanchey, R. H.
Studies on the growth and flowering of *Saintpaulia ionantha*, variety Orchid Wonder, under fluorescent light.
Diss. Abstr., 1960, **20**: 3035-6, being *L.C. Card No. Mic.* 60-69 of 82 pp.

For another account see *H.A.*, 26: 3971.

5841. Woodcock, W. P., and Dimock, A. W.
The effect of temperature on the protective action of selected fungitoxicants against snapdragon rust.
From abstr. in *Phytopathology*, 1960, **50**: 242.

Captan, copper and sulphur gave better control of *Puccinia antirrhini* on snapdragons at 65° F. than at 55° F. Zineb and chloranil gave essentially complete protection at 45°, 55° and 65° F.

5842. Schnack, B., and Fehleisen, S.
Herencia de dos caracteres mutantes en *Matthiola incana* R. Br. (**The inheritance of two mutant characters in *Matthiola incana*.**) [English summary 7 lines.]
Rev. Fac. Agron. B. Aires, 1959, **35**: 25-30, bibl. 2, illus.

The simple recessive factor for male sterility in stocks showed linkage with that for opaque flower colour. The other simple recessive factor investigated, that for puckered leaves, was associated with reduced vitality, and a linkage was suspected between it and red flower colour.

5843. Mühlenberg, C. E., and Naumann, L.
Observaciones sobre cambios cromosómicos estructurales en *Matthiola incana* R. Br. (**Observations on structural changes in chromosomes of *Matthiola incana*.**)
Rev. Fac. Agron. B. Aires, 1959, **35**: 39-45, bibl. 2, illus.

Mainly concerned with male sterility.

5844. Tayama, H. K., and Kamp, J. R.
Column stocks and companion crops—1. Response of column stocks to temperature variations.
Ill. St. Flor. Ass. Bull., 1960, No. 203, pp. 6-7.

Groups of seedlings treated at 55°, 60° and 65° F. were each divided into a further 3 groups, 1 remaining at the same temperature and 1 going to each of the other 2 temperatures, giving 9 temperature combinations in all. Rosetting occurred in the plants grown continuously at 65° F. Stocks grown continuously at 60° F. bloomed earliest and also had the longest stem length, and those finished at 60° F. produced the longest inflorescences with the highest flower stem weight. In general, a continuous temperature of 60° F. gave more favourable results than any of the other combinations.

5845. Harborne, J. B.
Flavonoid pigments of *Lathyrus odoratus*.
Nature, 1960, **187**: 240-1, bibl. 7.

Anthocyanins and flavonol glycosides of 3 colour types represented by Air Warden, Harrow and Jupiter.

5846. Schnack, B., Fehleisen, S., and Cocucci, A. E.
Estudios en el género *Verbena*. (**Studies on the genus *Verbena*.**)
Rev. Fac. Agron. B. Aires, 1959, **35**: 47-56, bibl. 6, illus.

Evidence of apomixis from cytology and morphology.

Bulbs, tubers, etc.

(*See also* 4686, 4749, 4758, 4810, 5233, 5236, 5724, 5731, 5802, 6331.)

5847. VOORS, H. J.
Honderd jaren bloembollencultuur. **(A hundred years of bulb growing.)**
Weekbl. BloembollCult., 1960, **70**, Spec. No. 6 May, pp. 44.

A survey of Dutch bulb growing and trade.

5848. DE RUITER, J.
Verbetering van werkomstandigheden. **(Improvement in working conditions.)**
Weekbl. BloembollCult., 1960, **70**: 568-9, illus.

Improved lighting, noise abatement, adjustment of bench height, and suitable indoor and outdoor clothing for workers in the bulb industry are discussed, with a view to increasing production.

5849. ANON.
West-Friesland produceert tuinbouwwerktuigen. **(West Friesland produces horticultural machines.)**
Weekbl. BloembollCult., 1960, **70**: 570.

Brief notes on machines for washing, peeling, winnowing, sorting, planting and harvesting bulbs and corms.

5850. DE RUITER, J.
Het gebruik van laadborden op bloembollenbedrijven. **(The use of loading boards on bulb farms.)**
Weekbl. BloembollCult., 1960, **70**: 594, illus.

Low, portable platforms for holding stacks of trays, parcels, etc.

5851. V.D. WANT, J. P. H.
Bladluis en virus. Selectie blijft beste bestrijdingsmiddel. **(Aphids and virus diseases. Selection remains the best means of control.)**
Weekbl. BloembollCult., 1959, **70**: 460-1.

Numerous examples of aphid-transmission of viruses in horticultural crops, particularly ornamentals, are quoted. It has been noted that aphids are more strongly attracted by yellow than by other colours, a fact which can be made use of in installing traps. Insecticides used in bulb crops do not kill the aphids rapidly enough to prevent their infecting the plants, and at present the only satisfactory control measure is the removal of all plants showing even the slightest symptoms.

5852. OELKER, G.
Amaryllis e *Hippeastrum*. **(*Amaryllis* and *Hippeastrum*.)**
Frutticoltura, 1960, **22**: 169-73, illus.

Notes on species, hybrids, biology, general cultivation and propagation.

5853. TWISK, D.
Brodiaea syn. *Triteleia*. **(*Brodiaea*, synonym *Triteleia*.)**
Weekbl. BloembollCult., 1960, **70**: 526, 545.

Brodiaea laxa is in increasing demand as a cut flower. Brief information is given on its propagation from seed, soil requirements, fertilizing, harvesting and storage of bulbs, and soil disinfection with PCNB against *Sclerotium tuliparum* and *S. bulborum*. Experiments on forcing showed that the earliest and most prolific flowering was achieved by storing the bulbs at 17° C., or for 2 weeks at 20° C. followed by 17° C., from mid-August until planting in mid-December. Gentle pulling was preferable to cutting for flower harvesting.—R.T.C., Lisse.

5854. ROGERS, O. M.
Breeding and cytology of selected species in the genus *Crocus*.
Diss. Abstr., 1960, **20**: 3033-4, being *L.C. Card No. Mic.* 59-6793 of 115 pp.

Chromosome numbers of 48 *Crocus* species, varieties and cultivars were determined. No relationship could be found between phenotypes and chromosome number variations within the species. In trials to determine the best cultural methods for growth and forcing several lots did not produce adequate flowers or pollen. This, it is thought, was caused by an unsuitable temperature during winter storage.—Pa. St. Univ.

5855. SLOOTWEG, A. F. G.
Ziekten van bloembollen veroorzaakt door *Aphelenchoides*-soorten. **(Bulb diseases caused by *Aphelenchoides* species.)**
From abstr. in *Tijdschr. PlZiekt.*, 1960, **66**: 126.

Aphelenchoides hodsoni has recently caused widespread damage to crocuses in Holland. Control can be obtained by hot water treatment at 43½° C. for 3 hours; this should be done not later than a week after lifting, and before treatment the corms should be stored at 23° C. Marked reduction of the population of *A. fragariae* on *Lilium speciosum* cv. *rubrum* can be obtained by 6–8 sprays of a 0·5% solution of 25% parathion emulsion; hot water treatment for 1 hr. at 43½° C. killed all the nematodes but caused injury to the bulbs.

5856. PALMER, L.
Cyclamens.
J. roy. hort. Soc., 1960, **85**: 210-17, illus.

Notes on the cultivated species.

5857. LEGRO, R. A. H.
The cytological background of cyclamen breeding. [Dutch summary 1½ pp.]
Meded. LandbHogesch. Wageningen, 1959, **59**(8): 1-51, bibl. 59, plus 8 pp. plates.

Covering cytological technique and the cytology of cultivars, diploid × tetraploid crosses and species.

5858. Bruce, J.
Watering pot-grown cyclamen.
Gdnrs' Chron., 1960, **147**: 120, illus.

In a preliminary trial plants in pots plunged in moist peat, which was watered from below, were compared with pots similarly plunged but watered from above. The temperature of the sub-irrigated peat was 1° to 2° F. lower than where the pots were watered from above, and the sub-irrigated plants made stronger root and top growth and produced more flowers.—Edinb. E. Scot. Coll. Agric.

5859. Banerji, M. L.
Leaf ascidia of dahlia.
Sci. and Cult., 1960, **25**: 646-7, bibl. 5.

Anatomical abnormalities in *D. rosea* observed in weak seedlings, which subsequently died.

5860. Woltz, S. S.
Adequate boron treatment is required in glad, mum growing.
Flor. Exch., 1960, **134**(19): 13, 44-5.

Symptoms of B deficiency and toxicity in gladioli and chrysanthemums.

5861. Gigante, R.
Una forma di mosaico del gladiolo causata dal virus del mosaico del cetriolo. (**A form of gladiolus mosaic caused by cucumber mosaic virus**).
Boll. Staz. Pat. veg. Roma, 1959 (issued 1960), **17**: 45-60, bibl. 22, illus.

Description of symptoms caused by cucumber mosaic virus in gladiolus, resulting in serious damage to leaves, stalk and flowers.

5862. Forsberg, J. L.
A summary of 1959 gladiolus control tests in Illinois.
Ill. St. Flor. Ass. Bull., 1960, No. 201, pp. 5-6.

Tests on 11 corm treatments for the control of fusarium and curvularia rots, and of 5 soil treatments for the control of sclerotinia rot are listed and the results tabulated. In the corm treatments 100 corms of each of the varieties Elizabeth the Queen, Valeria and Spic and Span were used in each treatment. With Elizabeth the Queen control was obtained with all treatments except Spor-Rid and BFV. Emmi and Ceresan 200 gave the best control with Valeria. Emmi, Ceresan 200, Hercules 3944 dust and Hercules 4223 dust were most effective with Spic and Span. Terraclor 20% dust (200g./10 ft. of row) was the best of the soil treatments, which were applied to the furrows after the corms were set. The furrows were closed immediately after the application.

5863. Forsberg, J. L.
Relationship of the bulb mite *Rhizoglyphus echinopus* to bacterial scab of gladiolus.
From abstr. in *Phytopathology*, 1959, **49**: 538.

Clean corms and corms made scabby by *Pseudomonas marginata*, when planted in a greenhouse in raw soil from a field where scab had occurred, all produced scabby corms. Clean and scabby corms planted in steamed soil produced clean corms. The mite was found on all scabby corms, but none was found on clean corms. *Pseudomonas* developed on agar plates to which mites had been transferred, and the mite multiplied rapidly. Severe scab developed on plants grown in soil infested with the cultured mites. Only a few minor lesions developed on plants grown in soil to which a culture of *Pseudomonas* had been added. Mites on agar plates were all dead 5 days after 20% aldrin granules had been scattered over the agar surface.

5864. (v.d. Want, J. P. H.)
Praktische problemen bij onderzoek van virusziekten. (**Practical problems in the study of virus diseases.**)
Weekbl. BloembollCult., 1960, **70**: 625, 627.

Virus-free strains of hyacinths of the varieties King of the Blues and Queen of the Pinks have been obtained by the slow process of tissue culture, selecting healthy cells from diseased plants. Control of rattle virus in tulips has been achieved with formalin treatment in preliminary trials.

5865. Simonet, M.
Hybrides interspecifiques amphidiploïdes d'iris. (**Interspecific amphidiploid iris hybrids.**)
Reprint from *Proc. IX int. bot. Congr. Vols. II, IIA*, [1959], 1 page.

Brief cytogenetical details. [See also *H.A.*, 29: 1707.]

5866. Grbić, V.
Prilog poznavanju biologije peruničine lisne zolje. (**A contribution to the knowledge of the biology of *Rhadinoceraea micans***). [English summary ½ p.]
Zasht. Bilja, 1959, No. 51, pp. 95-100, bibl. 4, illus.

R. micans, infesting *Iris germanica* and *I. pumila* in Yugoslavia, can be controlled by DDT.

5867. Davis, J. S.
Reproductive biology of California lilies.
Diss. Abstr., 1960, **20**: 2510, being *L.C. Card No. Mic.* 59-4413 of 66 pp.

Almost complete self-incompatibility in 14 species.

5868. de Graaf, J.
Lilies from seed.
Gdnrs' Chron., 1960, **147**: 366-7, illus.

Notes on hand pollination, pollen storage and raising seedlings.

5869. Shimada, T., Yamada, Y., and Takeshita, H.
On the formation of bulb and flower in the cluster-flowering jonquil, *Narcissus jonquilla* L. [Japanese, with English summary.]
Agric. Bull. Saga Univ., 1957, **6**: 71-81, illus., from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 46,758.

A detailed description of the development of leaf and flower primordia.

5870. Woodville, H. C.
Further experiments on the control of bulb fly in narcissus.
Plant Path., 1960, **9**: 68-70, bibl. 6.

A cold dip containing 0·2% aldrin was effective against *Merodon equestris*. Aldrin dust, 7 lb. actual per acre, or chlordane spray, 10 lb. actual per acre, applied to the bottom of the drill before planting also gave good protection. [See also *H.A.*, 29: 730.]—N.A.A.S., Starcross, Exeter.

5871. Lyle, R. E., and others.
The alkaloids of *Nerine bowdenii* W. Wats. and *Crinum moorei* J. D. Hook.
J. Amer. chem. Soc., 1960, **82**: 2620-5, bibl. 22.

Bulbs of *Nerine bowdenii* contain at least 16 alkaloids, 4 of which have not been reported to date, and the seeds of *Crinum moorei* contain 5 alkaloids, one of which has not previously been isolated from natural sources.

5872. Carlsson, G.
Tulpaner. **(Tulips).**
Medd. Gullåkers VäxförädlAnst., Hammenhög, **16**, 1960, pp. 216, bibl. 28, illus, kr. 18.—obtainable from Otto J. Olson & Sons A.B., Hammenhög, Sweden.

In view of the scarcity of books on tulip growing the publication of this manual is an event, interest in which should not be limited to Sweden. Here the cultivation of the tulip has made such strides in recent years that Hammenhög has been likened to Haarlem in Holland. The book is based on the author's own experiments carried out for 15 years in the centre of the tulip growing area. It has been written for the grower and deals most thoroughly with the following subjects: History, culture, forcing, diseases and pests. It is obvious that findings and recommendations have been made with special reference to Swedish conditions, but the local emphasis should not detract from the general value of the book. This is enhanced, for Swede and foreigner alike, by the large number and high quality of the illustrations, some of which are coloured. A detailed list of contents makes it easy to find information on individual subjects.

5873. Kraayenga, D. A.
Grond, klimaat en groei bij tulpen. **(Soil, climate and growth in tulips.)**
Weekbl. BloembollCult., 1959, **70**: 461.

Tulip bulb production was compared in 5 districts in Holland. In general, the highest figures were from sandy soils, but not in very dry seasons. Temperatures above average were beneficial until the middle of May, but had a growth checking action after this. Transpiration showed a maximum in May and fell sharply in the first 10 days of June. Experiments have not revealed the ideal distribution of irrigation, but it is generally necessary from the week before flowering until 5–6 weeks after flowering. Watering from the beginning of April gave the highest yield, but beginning a fortnight later gave the earliest flowering. The provision of windbreak hedges was not beneficial, and the use of gauze for shading, particularly during May, reduced yields. The increase in bulb size is strongly affected from late April to June by air humidity, very little thickening taking place in dry weather, and, contrary to popular belief, scarcely any in the last week before harvesting.

5874. Lenander, S.-E.
Drivningsförsök med tulpaner. **(Forcing trials with tulips.)** [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdsförs. Alnarp **127**, 1959, pp. 16, bibl. 7.

Swedish- and Dutch-grown bulbs of the tulip variety Brilliant Star were put into storage on three dates in September at intervals of ten days. The length of the shoot was measured at the time of removal from storage and again after forcing, and it was found that long shoots were associated with a long period of storage. Bulbs which forced easily were not affected by the length of the storage period, but with bulbs that were difficult to force early storage and late removal reduced the time needed for forcing by up to six days. Late removal had, moreover, the effect of concentrating the time of flowering and of increasing the proportion of early flowering bulbs. Early removal, on the other hand, tended to extend the period of flowering. Although forcing qualities varied from lot to lot, Swedish-grown bulbs were generally forced more easily than Dutch-grown bulbs.

5875. Liemburg, J.
Koelproven met tulpenplantgoed 1958/'59. **(Chilling experiments with tulip bulbs, 1958-59.)**
Weekbl. BloembollCult., 1960, **70**: 590-1.

Tulip bulbs of 9 varieties were stored (A) at 20° C. throughout, (B) at 20° C. for 4 weeks and afterwards at 13° C., (C) at 30° C. for the first 2 and at 9° C. for the last 6 weeks, with 17° C. in the interim, and (D) at 30° C. for the first 2 and 9° C. for the last 7 weeks, with 20° C. in the interim period. They were planted in early November and harvested in June. Treatment (A) gave the highest yields of saleable bulbs and the greatest percentage of large bulbs, and with most varieties treatment (B) was not far behind as regards yield. Treatment (C) and (D) gave lower, but reasonably good, yields. The storage of these harvested bulbs was carried out with or without a first week at 34° C., the temperatures over the rest of the period being 20°, 17° and 9° C. or 17° and 9° C. After greenhouse planting in November (17–18° C.) the first flowers were produced at the beginning of December, the warmth during early storage having advanced the flowering date and increased flower size. The first varieties to flower were Paul Richter, Emmy Peeck and White Sail.—R.T.C., Lisse.

5876. ANON.
Goede kwaliteit ook van niet gekoelde tulpen. **(Good quality blooms even from non-chilled tulip bulbs.)**
Weekbl. BloembollCult., 1960, **70**: 527.

A list is given of tulip varieties which gave excellent results without cold treatment, but it is emphasized that the results refer only to one season and need further confirmation.

5877. SCHOUTEN, A.
Beregening van tulpen op klei- en zavelgronden. **(Irrigation of tulips on clay and sandy clay soils.)**
Weekbl. BloembollCult., 1960, **70**: 823.

In a dry spring tulip bulbs should be watered once or twice before, and once or twice after, flowering, supplying 15–20 mm. of water each time. In 2 successive years irrigation increased the yield of top-sized bulbs of Rose Copeland by 250 and 380 per sq. R.R. (14·19 sq.m.). Heavy or excessive irrigation must obviously be avoided, particularly on clay soils.

5878. DUBOS, R. J.
Tulipomania and the benevolent virus.
Gdn. J. N. Y. bot. Gdn, 1960, **10**: 41-3, 66-7, bibl. 7, illus.

The history and effects of the tulip "breaking" viruses.

5879. PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
Het tulpestengelaaltje (*Ditylenchus dipsaci* (Kühn) Filipjev). **(The tulip stem eelworm.)**
Vlugschr. PlZiekt. Dienst, Wageningen **77**, 1960, pp. 6, illus.

Symptoms, hosts, prevention and control.

5880. SLOOTWEG, A. F. G.
De strijd tegen het tulpestengelaaltje. **(Control of the tulip stem nematode.)**
Weekbl. BloembollCult., 1960, **70**: 843-4.

Weed hosts include chickweed [*Stellaria* spp.], groundsel [*Senecio vulgaris*], shepherd's purse [*Capsella bursa-pastoris*], grasses and wild onions. These, except for groundsel, are controllable by CIPC. Cultivated hosts include scillas, snowdrops, irises, hyacinths, narcissi, phlox, strawberries and onions. The nematode should be exterminated, if the infested soil is dug 3 spits deep and kept free from susceptible species for 2 years. Where steaming is used for soil disinfection, the minimum depth of treatment should be 50–60 cm. [For bulb treatment see *H.A.*, 30: 4184.]

5881. HORTON, D. E.
Warm storage of tulip-bulbs reduces loss.
Grower, 1960, **53**: 1448.

Bulbs intended for hot water treatment should be lifted when the leaves have become discoloured. They should then be stored at 70–90° F. for 2–3 weeks. Glasshouses are suitable, but the bulbs must be protected from direct sunlight, and air circulation is important. After warm storage the bulbs should receive hot water treatment, usually at 110½° F. for 2½ hours. The bulbs should then be stacked thinly in trays with good ventilation until required for planting. [See also *H.A.*, 30: 1011.]—N.A.A.S., Kirton, Lincs.

5882. GESSNER, F.
Die Blütenöffnung der *Victoria regia* in ihrer Beziehung zum Licht. **(The opening of the *Victoria regia* flower in relation to light.)**
Planta, 1960, **54**: 453-65, bibl. 10, illus.

The flowers will open following a dark period of 30 minutes begun not earlier than 4 p.m.

5883. SINGH, H. P.
On the autecology of *Zephyranthes flava* Pav. ex Roem. & Schult.
Sci. and Cult., 1960, **25**: 642-4, bibl. 7, illus.

Notes on association, germination and flowering.

Lawns and sports turf.

(*See also* 5231, 5233, 5271-5278, 5352, 6329.)

5884. DAWSON, R. B.
Lawns.
Penguin Handbook No. 56, 1960, 7 × 4½ in., pp. 176, illus., 6s.

The author of this handbook, the sixth in a most admirable and inexpensive series on gardening, is director of the Sports Turf Research Institute at Bingley and is well known for his books and pamphlets on lawn management. The reader could not have a more reliable source of information and will find it presented in a straightforward and practical manner. Design and construction of new lawns, choice of grasses, management of new and established lawns, weed control, pests and diseases are all fully dealt with, taking into consideration the problems and facilities of the home gardener. Advice is also given on the care of verges, banks and grass below trees, and a brief outline is given of the special requirements of sports lawns and grass in public parks. The numerous photographs are well chosen to illustrate the various operations and equipment described, and to help identify the common lawn grasses, weeds, pests and diseases.

5885. SALIMEI, F. S.
Come si forma un prato ornamentale. **(How an ornamental lawn is made.)**
Ital. agric., 1960, **97**: 403-7, illus.

Notes on soil preparation, suitable grasses, legumes, and other species, and establishment.

5886. Duich, J. M., and Musser, H. B.
Response of Kentucky bluegrass, creeping red fescue, and bentgrass to nitrogen fertilizers.
Progr. Rep. Pa agric. Exp. Stat. **214**, 1960, pp. 20, bibl. 16, illus.

Ureaform compounds gave the slowest rates of growth but produced responses over the longest periods. Natural organics were intermediate, with responses influenced to a greater extent by environmental conditions. The greatest total growth was obtained from soluble N carriers, but it was largely produced during a period of 4 to 6 weeks following application, after which growth fell off rapidly. The ureaform compounds applied at rates of less than 4 lb. of total N per 1,000 sq. ft. per season did not evoke sufficient responses in Merion Kentucky bluegrass and mixed bentgrass to maintain good quality turf. Rates of 2 to 4 lb. were adequate for creeping red fescue. Single applications of soluble N carriers did not produce as uniform growth and quality of turf throughout the season as did the natural organics and ureaform products tested. Applications of calcium cyanamide to dormant turf at rates of more than 4 lb. of total N per 1,000 sq. ft. depressed early spring growth because of initial injury following treatment. The turf recovered eventually and showed a response similar to that obtained with ammonium sulphate and urea. Rates of response to ureaform compounds varied with the availability indexes and the amounts of insoluble N. Differences in the growth response and quality of creeping bentgrass putting-green turf were not consistent, when a total of 8 to 10 lb. of N per 1,000 sq. ft. was supplied in single or autumn and spring applications of ureaform, in 5 to 6 monthly applications of natural organics or in 10 to 12 fortnightly applications of soluble materials. It is concluded that the growth rate and quality of turf produced by any N fertilizer depend primarily upon how the material is used rather than the form in which it is applied. [From authors' digest.]

5887. Perry, V. G., Darling, H. M., and Thorne, G.
Anatomy, taxonomy and control of certain spiral nematodes attacking blue grass in Wisconsin.
Res. Bull. Univ. Wis. **207**, 1959, pp. 24, bibl. 30, illus.

See *H.A.*, 29: 2777.

5888. Polivka, J. B.
Small amounts of insecticides effective in controlling grubs of the Japanese beetle.
J. econ. Ent., 1960, **53**: 320, bibl. 2.

Grub population counts and soil residues [see *H.A.*, 29: 3902] indicated that chlordane, heptachlor and aldrin, in minute quantities, are each highly effective in controlling Japanese beetle grubs in turf.—Ohio agric. Exp. Stat., Wooster.

Orchids.

(*See also* 6289.)

5889. Richardson, M. M.
The chromosomes of some British orchids.
Reprint from *Proc. Univ. Durham phil. Soc.*, [1959?], **9**: 135-40, bibl. 7, illus.

Gymnadenia conopsea, Platanthera chlorantha, P. bifolia, Ceologlossum viride and *Goodyera repens.*

5890. Vöth, W.
Die Aussaat und Sämlingsentwicklung von *Peristeria elata* Hook. (**The sowing and seedling development of *Peristeria elata*.**)
Mitt. Klosterneuburg, Ser. B, 1959, **9**: 6-9, bibl. 1, illus.

This article describes pollination and sowing on a sugar-agar medium after seed collection in the spring. Seed storage and autumn sowing depressed germination and seedling development.

5891. Gäumann, E., Nüesch, J., and Rimpau, R. H.
Weitere Untersuchungen über die chemischen Abwehrreaktionen der Orchideen. (**Further studies on the chemical defence reactions in orchids.**) [English summary 1 p.]
Phytopath. Z., 1960, **38**: 274-308, bibl. 12, illus.

All the 24 central and south European orchids tested proved capable of chemical defence reactions against their mycorrhizal fungi. Sixteen of these species synthesized orchinol as a defensive substance. Some of them, e.g. *Orchis militaris*, were also capable of responding with the production of a second unidentified defensive substance. Other species produced other substances as yet unidentified. The capacity to synthesize orchinol did not appear to be characteristic of any one group of related species. All the 19 mycorrhizal fungi isolated from terrestrial orchids proved able to initiate a chemical defence reaction, most commonly the synthesis of orchinol. Orchinol possessed a broad and non-specific antibiotic action against most of the 19 mycorrhizal fungi as well as against 24 ordinary soil-inhabiting fungi. Soil-inhabiting bacteria, on the other hand, were usually not affected by orchinol. [For earlier work, see *H.A.*, 29: 3904, 3905 and 30: 4237].—Inst. spez. Bot., Eidg. tech. Hochsch., Zürich.

Foliage and succulent plants.

(*See also* 4704-4708, 4724, 4755, 5799, 5802, 5915.)

5892. Roth, I.
Über die Öffnungs- und Schliessbewegungen der Blüten von *Bulbine semibarbata* und ihre experimentelle Beeinflussbarkeit. (**The opening and closing movements of the flowers of *Bulbine semibarbata* and some experimental factors affecting them.**)
Phyton, 1959, **13**: 65-76, bibl. 7.

Normal flowering was found to require the alternation of light and darkness. The effects of permanent light and permanent darkness on the endogenous rhythm of the flowers are described.

5893. WALTHER, E.
Echeveria.
Amer. hort. Mag.,* 1960, **39**: 73-91, illus.

History and recommended species and hybrids, with many excellent photographs.

5894. SCHMALZ, H.
Der Einfluss von Gibberellin auf die Blütenbildung von *Kalanchoe blossfeldiana*. **(The effect of gibberellin on flower formation in *Kalanchoe blossfeldiana*.)**
Naturwissenschaften, 1960, **47**: 20, bibl. 3.

The results of several experiments suggest that gibberellin will promote flowering in *Kalanchoe blossfeldiana* only in conjunction with strong short-day induction.—Inst. f. PflZücht., Univ. Halle, Hohenthurm.

Roses.

(*See also* 4749, 4808, 5004, 5802, 5911, 6331.)

5895. FAIRBROTHER, F.
Roses.
Penguin Handbook No. 37, 1958, 7 × 4½ in., pp. 180, illus., 5s.

This very practical handbook, written by a well known authority on roses and published in collaboration with the Royal Horticultural Society, contains material of interest both to the beginner and to the experienced rose grower. The introductory chapter on the ancestry of our modern roses, which gives fascinating glimpses into ancient history and the work of plant breeders, is followed by sound and detailed advice on planning the rose garden, preparing the beds, buying and planting the trees, pruning and feeding. Ways of recognizing and controlling the commoner pests and diseases are briefly and adequately dealt with. Other chapters are devoted to propagation by cuttings, budding and hybridizing, growing roses under glass and exhibiting.

The shrub roses are by no means neglected and descriptions are given of a representative selection. For guidance in the choice of hybrid tea roses there is a descriptive list of 80 good varieties grouped according to colour. Lists of floribundas, climbers and ramblers are also included. Finally, a series of monthly reminders will provide some useful hints for beginners.

The photographs, necessarily in black and white at this price, are many and good. The book is exceptionally good value for money.

5896. NATIONAL ROSE SOCIETY OF GREAT BRITAIN.
The rose annual, 1960.
National Rose Society, London, 1960, 8 × 5½ in., pp. 172, illus.

This year's number contains several interesting articles on the lesser known groups of roses, such as the musk rose, the so-called "hybrid musks" and the ancestral China roses. Seven expert rosarians give their personal selection of the best varieties of hybrid teas for general cultivation, and W. Kordes writes on repeat-flowering climbers. For beginners there are some useful notes on culture in the open and in the greenhouse and on exhibiting, and for amateur plant breeders there is a good account of the method of raising new seedling roses. On the subject of black spot, two interesting observations are reported: this stubborn disease appeared to be kept at bay by either an intermittent mist spray of plain water throughout the summer months or by spraying with Daz detergent as soon as the spots appeared. Whether these observations will prove to be of practical significance remains to be seen.

5897. AMERICAN ROSE SOCIETY.
American rose annual 1959, No. 44.
American Rose Society, Columbus, Ohio, 1959, 8 × 5 in., pp. 264, illus.

In addition to notes on rose growing in many parts of the United States, ranging from the far northern conditions of Alaska to Hawaii and Florida, this *Annual* contains several interesting research articles. A method of timing outdoor roses to flower on a particular date, by pinching out the flower buds, is described by R. F. Stinson. Tests with 31 fungicides or spray mixtures for control of black spot and powdery mildew of roses, and their effect on the foliage, are reported by L. M. Massey, J. S. Melching and J. A. Naegele. The need for selection of rose rootstocks is stressed in an article by A. N. Roberts, who compared the performance of roses on many strains of *R. multiflora*. Articles of interest to plant breeders include "The effect of plant patent protection in the United States", by J. F. Lemon, "Observations on the genetics of doubleness in roses," by D. Morey, and "Cytology of two fertile triploid roses", by H. D. Wulff. The cold hardiness of rose varieties is assessed by G. J. Buck. Finally there are reports on the performance of new rose varieties.

5898. LUNDSTAD, A.
Forsøk med sorter av buskroser. **(Variety trials with shrub roses.)** [English summary 30 lines.]
Forskn. Landbruk., 1960, **11**: 57-95, bibl. 10, illus.

Descriptions are given of 125 shrub rose species and varieties grown during the period 1952-58 at the Institute of Dendrology and Nursery Management of the Agricultural College of Norway. Of these 22 varieties were selected as being of outstanding value.

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* Formerly *Nat. hort. Mag.*

5899. Sakai, A.
The frost-hardiness of roses. I. Differences in grade of frost hardiness among rose varieties. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 310-16, bibl. 8, illus.

Several species and varieties are listed with the minimum temperatures at which their canes survive following 24 hours winter freezing. Canes of *R. pendulina* and *R. rugosa*, which had been immersed in liquid O_2 for 24 hours after treatment at—30° C. for 16 hours, were thawed and planted in moist sand. The canes produced buds but gradually withered, because the cells of the inner cortex, pith-rays, and pith periclinal tissue were less resistant to freezing at −30° C. than the parenchyma cells of the cortex and buds.

5900. Abernathie, J. W.
The effects of soil calcium, potassium, and phosphorus on pigmentation in Better Times roses.
Diss. Abstr., 1960, **20**: 2999-3000, being *L.C. Card No. Mic.* 60-134 of 120 pp.

The colour of Better Times roses grown in the greenhouse at 2 levels of P, K and Ca was determined at 6 dates over all 4 seasons of the year. High levels of both P and K reduced the amount of red and increased the amount of blue colour. Ca had no effect on the original flower colour. It was found that roses having the most red and the least blue colour when cut still had the most red and least blue after 18 days in cold storage. Under all circumstances, however, storage increased blueing. Low levels of P and K and high levels of Ca retarded the disappearance of the red and the appearance of the blue colour. Roses cut during the summer were redder than those cut during the other seasons, and the reduction of the peak summer temperatures by 10–15° F. was sufficient to reduce the amount of red and increase the amount of blue colour. The pigments responsible for flower colour included anthocyanins and anthoxanthins, together with some unidentified materials. There was some evidence that colour was altered by the presence of tannins.—Univ. Ill.

5901. Twigg, M. C.
Physiological and chemical studies on the keeping quality of Better Times roses.
Diss. Abstr., 1960, **20**: 2479-81, bibl. 1, being *L.C. Card No. Mic.* 59-5367 of 100 pp.

The N status of the plant had no apparent effect on the keeping quality of cut Better Times roses. Excessively high P concentrations in the substrate resulted in more rapid and more extensive blueing. Qualitative or quantitative changes in the anthocyanin pigment were apparently not responsible for colour changes in the petals. Higher pH values, a higher P content of the petals and higher concentrations of an anthoxanthin pigment were associated with blueing. Phenolic compounds (tannins) were found to be higher in blue petals than in non-blue petals. The retention of the more desirable colour found to be associated with the use of flower preservatives was accompanied by a reduction in pH values and in the concentration of an anthoxanthin pigment. The fact that the colour of petals associated with the use of flower preservatives was not the normal colour of Better Times roses is indicative of an additive complex being formed in the petals with a material found in the preservative. Better Times roses were found to contain an anthocyanin, having an absorption peak at 515 mμ in a 0·1 *N* hydrochloric acid extract, and an anthoxanthin, having an absorption peak at 355 mμ in an ethyl acetate extract. [From author's summary]—Ohio St. Univ.

5902. Pope, T. E.
The effect of modified atmospheres and various temperatures during storage on the respiration rates, color indices and keeping quality of Better Times roses.
Diss. Abstr., 1960, **20**: 3463-4, being *L.C. Card No. Mic.* 60-787 of 143 pp.

A study was made of the after-storage quality of Better Times roses, as affected by pre-storage treatment at 50° F. with stems in water for 0, 12 and 24 hours, and of the rates of respiration of the flowers, stems with foliage and flowering stems at 45° and 60° F. Roses were packed and stored for various periods in normal air, in atmospheres enriched with up to 20% CO_2 and in atmospheres modified by decreasing the O_2%. Storage temperatures from 30° F. to room temperature were used. There was a reduction in the amount of yellowness and redness and an increase in lightness as the flowers approached senescence and/or as the storage period was lengthened. Increasing the length of the pre-storage period decreased the amount of red colour but increased the number of flowers which opened after removal from storage. A reduction in storage temperature resulted in a decrease in respiration rates. Flowers alone had a higher respiration rate than stems with foliage, and the lowest rate was shown by the flowering stem. Storage in a slightly modified atmosphere did not increase the life of the flowers, and a more drastically modified atmosphere produced undesirable effects, such as stem and petal necrosis, flaccid petals and necks, and blueing. The rate of aerobic respiration was lower when the O_2 concentration was reduced below that of air, but there was no marked reduction in the rate of respiration associated with changes in the CO_2 concentration. Visual observations were found to be the best method of quality assessment. For the most satisfactory results Better Times roses should first be held at 50° F. with their stems in water for 12 hours, then packed in sealed Cellothene bags and stored in normal air at 32° F. for not longer than 12 days.—Ohio St. Univ.

5903. Pearman, J. A.
Diseases of roses.
Agric. Gaz. N.S.W., 1960, **71**: 62-70, illus.

The diseases, which are described together with methods of control, include: black spot (*Actinonema rosae*), powdery mildew (*Oidium* (*Sphaerotheca*) *pannosa*), rust (*Phragmidium mucronatum*), stem canker (*Coniothyrium fuckelii*), crown gall (*Agrobacterium tumefaciens*), root knot (*Meloidogyne* sp.), rose wilt and mosaic virus diseases.

5904. Holmes, F. O.
Cure of rose mosaic disease—by heat.
Plants and Gdns, 1959-60, **15**(4): 38, bibl. 1, illus.
Cure of rose mosaic by heat.
Abstr. in *Phytopathology*, 1960, **50**: 240.

Mosaic-infected rose cuttings were rooted and hardened off, and then kept at a soil temperature of 34°–36° C. for various periods of 1 to 10 weeks. Plants heated for 1–3 weeks remained mottled, but those heated for 4–10 weeks produced new unmottled foliage.

5905. Palmer, J. G., and Henneberry, T. J.
Blackspot and powdery mildew of roses.
Amer. hort. Mag.,* 1960, **39**: 108-10.

Conditions favourable for the development of *Diplocarpon rosae* and *Sphaerotheca pannosa* are reviewed, and composite sprays for rose pests and diseases are listed, together with rates of application. The best control of blackspot was obtained with Phaltan or maneb, and Phaltan was also most effective against powdery mildew. In addition to the listed fungicides, zineb, ferbam or captan at 2 lb./100 gal. are also effective against blackspot and Actidione PM against powdery mildew. [See also *H.A.*, 29: 2792.]—U.S.D.A., Beltsville, Md.

5906. Naegele, J. A., Glancey, B. M., and Aller, H.
Red spider versus brave rose battle [sic] in new resistant study.
Flor. Exch., 1960, **134**(13): 53-4, 71.

Bayer 30686, Monsanto 10502 and parathion plus Prorex gave outstanding control of resistant mite strains on roses, but parathion plus Prorex caused considerable plant injury. Bayer 30686 compared favourably with Tedion and Aramite, but at higher dosages (0·02% and 0·05%) it caused leaf injury, particularly on miniature varieties. Further field trials of Monsanto 10502 showed uneven control but complete absence of plant injury.—Cornell Univ.

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* Formerly *Nat. hort. Mag.*

Other trees and shrubs.

(*See also* 4663, 4718, 4719, 4756, 4808, 4863, 5004, 5750, 5751, 5816, 5846, 6286, 6287, 6308, 6318, 6319.)

5907. Boddy, F. A.
Highway trees.
Park Administ., 1960, **24**: 543, 595, 598 and 1960, **25**: 23-4.

Notes on species suitable for narrow and wide streets in Britain.

5908. Say, J. S.
Trees for all.
N.Z. J. Agric., 1960, **100**: 365-73, illus.

Recommendations for the selection and planting of roadside trees in New Zealand.

5909. Browicz, K., and Bugała, W.
Rzadkie drzewa i krzewy w Arboretum Kórnickim. (**Rare trees and shrubs in the Kórnik Arboretum.**) [English and Russian summaries 1 p. each.]
Arbor. Kórnickie, 1959, **4**: 165-81, bibl. 12, illus.

Notes on *Aucuba japonica*, *Cercidiphyllum magnificum*, × *Amelasorbus jackii* and *Strachyurus chinensis*, with special reference to hardiness. [For some other species see *H.A.*, 29: 2797.]

5910. Plumridge, A. J.
Propagation of choice evergreen shrubs.
J. Agric. Vict., 1960, **58**: 127-30, illus.

Rhododendron, *Luculia gratissima*, *Erica melanthera* and *Gordonia anomala* by cuttings.

5911. Vergnano, O.
Effetti della vitamina B_1 e della vitamina B_6 sulla radicazione di alcune talee. (**Effects of vitamin B_1 and B_6 on the rooting of certain cuttings.**)
Nuovo G. bot. ital., 1959, **66**: 1-13, bibl. 23, illus.

When added to the nutrient solution at the rate of 0·01 mg. per l. in sand-culture trials vitamins B_1 and B_6 did not improve rooting of *Colutea arborescens* cuttings, which normally do not strike root, but had a very good effect on *Hedera helix* and on *Rosa* var. White Tonsendshon. In *Hedera helix* the percentages of good and slight rooting were 78 and nil with vitamin B_1, 72 and 28 with vitamin B_6 and 2 and 72 in the control. In *Rosa* the corresponding figures were 76 and 12%, 60 and 20% and 33 and 33%, respectively, and the treated plants had a much greater number of buds and leaves and much larger leaf blades than the controls.—Ist. Bot., Univ. Firenze.

5912. McCall, W. W., and Davidson, H.
Soil fertility studies with container grown ornamental plants.
Quart. Bull. Mich. agric. Exp. Stat., 1960, **42**: 474-81, illus.

Two evergreens (*Taxus media* and *Euonymus fortunei*) and 2 deciduous shrubs (*Forsythia intermedia* and *Buddleia davidi*) were grown in 5 soil types. Clay loam and sand-peat-clay loam produced the best plants. All responded to fertilizers and all resisted winter injury best when grown in clay loam or in the mixture containing clay loam.

5913. HOLMES, F. W.
Salt injury to trees.
From abstr. in *Phytopathology*, 1960, **50**: 240.

Sodium chloride and calcium chloride were applied for 6 years round maples, oaks, black birch and white pine, the salts being applied either to the soil over the roots weekly throughout the year, or to adjacent road surfaces for 15 weeks each winter. A sugar maple died after 186 weekly applications of 10 lb. NaCl each to the soil; the chloride concentration in its leaves was 76 times, and in its twigs 10 times, as high as that in the control maple. Other maples, birch and pine died after 201 applications of NaCl to the soil, but a white oak showed no injury from such treatment. Application of $CaCl_2$ to the soil surface for 6 years caused development of stunted yellow foliage on a red maple but no injury to a black oak. Treatment of adjacent road surfaces during winter for 4 years caused a 3- to 6-fold increase of chlorides in the leaves of sugar maples but no increase in the twigs; no symptoms of injury were apparent, and it is concluded that the salt is accumulated in the leaves and shed with them each autumn.

5914. JANES, R. L., AND OTHERS.
Controlling insects and diseases on ornamental trees.
Ext. Bull. Mich. St. Univ. **269**, revised 1959, pp. 38.

A very full coverage of diseases, pests and pesticide formulations.

5915. ROESLER, R., AND SCHNEIDER, H.
Gusathion for controlling scale insects on evergreen ornamentals.
Höfchen Briefe, 1959, **12**: 312-16.

Gusathion at 0·1 and 0·2% controlled scale insects on evergreen woody plants and ferns when applied once against *Coccus hesperidum* and *Saissetia hemisphaerica* and twice against *Aspidiotus hederae*. No spray damage occurred, provided the treatment was not carried out in full sunshine.—Res. Inst. Vitic. Hort., Neustadt a.d. Weinstrasse.

5916. RECKENDORFER, P.
Die Viruschlorose in ihren Beziehungen zum Eisen. Das Enzymprotein. Modellversuch mit *Abutilon striatum*. **(Virus chlorosis in its relationship to iron. The enzyme protein. An illustration with *Abutilon striatum*.)** [English summary 8 lines.]
PflSch. Ber. Wien, 1960, **24**: 73-81, bibl. 7.

The infiltration of Fe-chelate did not lead to the regreening of *Abutilon striatum* leaves affected with infectious variegation. The incidence of virus chlorosis is thought to be due to changes in the linkage conditions of both amino acid and the nucleotide sequences under the influence of virus nucleic acid. These changes would cause the denaturation of the enzyme protein with various consequences, including the retrogression of chlorophyll synthesis.

5917. SALIMEI, S.
L'*Acacia saligna* Wendl. **(*Acacia saligna*.)**
Ital. agric., 1960, **97**: 628, illus.

The tree will grow on poor, sandy or calcareous soils, and is useful for stabilizing sand dunes and forming windbreaks, as well as being ornamental. It lives only 18-20 years, but is easily renewed from suckers, or propagated by marcotting or from seed.

5918. SALIMEI, S.
La bougainvillea e le sue specie più adatte in Italia. **(The genus *Bougainvillea* and its species most suitable for growing in Italy.)**
Ital. agric., 1960, **97**: 551-5, illus.

Six varieties of *B. glabra*, 2 of *B. spectabilis* and the species *B. refulgens* are described, and notes are given on culture and propagation.

5919. MENNINGER, E. A.
The calabash trees.
Amer. hort. Mag.,* 1960, **39**: 34-40, illus.

The common calabash, Mexican calabash and black calabash (*Crescentia* spp.) described.

5920. SHAIN, W. A.
Christmas trees in Mississippi.
Miss. Fm Res., 1959, **22**(11): 8, illus.

Notes on growing Arizona cypress with a table showing costs and returns.

5921. BARRETT, W. H. G.
Los enebros cultivados en la Argentina. **(The junipers cultivated in Argentina.)**
Rev. Invest. agríc. B. Aires, 1959, **13**: 207-24, bibl. 20, illus.

Botanical descriptions of 17 species and their varieties and forms are followed by notes on propagation by seed, cuttings, layering and side cleft grafting.

5922. BROWICZ, K.
Gatunki z rodzaju *Cotoneaster* Ehrh. w. Polsce. **(Species of the genus *Cotoneaster* in Poland.)** [English and Russian summaries 2½ and 3 pp.]
Arbor. Kórnickie, 1959, **4**: 5-108, bibl. 238, illus.

A detailed study of *Cotoneaster integerrimus*, *C. melanocarpus* and *C. tomentosus*.

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* Formerly *Nat. hort. Mag.*

5923. Heimann, M.
Nochmals: Problem Erica-Sterben. **(Once again: the problem of "erica death".)**
Gartenwelt, 1960, **60**: 122-4, illus.

Data on 3 fungi and cultural factors responsible.

5924. Krasil'nikov, P. K.
Some characteristics of the root systems of five species of *Euonymus* at the age of two years in the Leningrad region. [Russian.]
Bot. Žurnal, 1960, **45**: 394-7, bibl. 8, illus.

The descending order of root penetration was: *Euonymus europaea*, *E. maackii*, *E. hamiltoniana*, *E. yedoensis* and *E. verrucosa*.

5925. Fritzsche, G.
Untersuchungen über Anbau- und Ertragsverhältnisse bei *Euphorbia fulgens*. **(Studies on the culture and yield of *Euphorbia fulgens*.)**
Süddtsch. Erwerbsgärtn., 1959, **13**: 1009-12, from abstr. in *InformDienst Weihenstephan*, 1960, No. 5, pp. 65-6.

Photoperiodism: One hour of darkness applied at 5–6 p.m. from 20 September to 31 October accelerated flowering and produced a higher percentage of saleable plants before Christmas. *Soil mixture:* The traditional mixture of leaf mould, peat and hotbed soil (2: 2: 1) proved superior to a somewhat heavier medium. However, soil structure was of greater importance than the constituents of the medium. *Cuttings:* Tip cuttings of 1-year-old plants yielded most flowers, when the plants were allowed to form several stems, although plants from cuttings trained to form single stems were of better quality. For 1-year-old cuttings trained to form single stems, 15 × 15 cm. was the best spacing as regards total yield, but better quality was achieved by wider spacing. *Age of plant:* An analysis of the profits obtained from 1-, 2- and 3-year-old plants suggests that half the crop should consist of 1-year-old plants and half of 2-year-old plants, the latter to be used also as parent plants. *Nutrition and watering:* A basic application of artificial fertilizers should be avoided, but *E. fulgens* tolerates a complete fertilizer solution at 0·1%. To high soil moisture *E. fulgens* responds with root rot and leaf drop.—Staatl. Lehr.- u. ForschAnst. Gartenb., Weihenstephan.

5926. Escalante, M. G.
Diferencias anátomo-morfológicas en ejemplares cultivados de *Fagara coco* (Gill.) Engl. (Rutáceas). **(Anatomical and morphological differences in cultivated specimens of *Fagara coco* (Rutaceae).**
Rev. Fac. Agron. B. Aires, 1959, **35**: 57-64, bibl. 5, illus.

The xeromorphic features of the wild form have been modified or have disappeared under cultivation as a result of the change from arid to humid conditions.

5927. Tryon, R., and Tryon, A.
Observations on cultivated ferns: the hardy species of tree ferns (*Dicksonia* and Cyatheaceae).
Amer. Fern J., 1959, **49**: 129-42, illus., reprinted in *Lasca Leaves*, 1960, **10**: 26-33.

An identification key and brief notes on 14 species.

5928. Suszka, B.
Dotychczasowe wyniki hodowli forsycji w Kórniku. **(Results obtained in breeding forsythia at Kórnik.)** [English and Russian summaries 1¼ pp. each.]
Arbor. Kórnickie, 1959, **4**: 205-25, bibl. 8.

Forsythia europaea and *F. ovata* are the only species sufficiently frost resistant in Poland. Newly bred hybrids between *F. ovata* and *F. intermedia*, producing highly ornamental flowers, withstood an air frost of —26·8° C. and a ground frost of —31° C.

5929. Patil, S. S., and Young, R. A.
The influence of temperature on development of *Phytophthora parasitica* root rot of fuchsia.
Phytopathology, 1960, **50**: 386-8, bibl. 6.

An outbreak of the disease in Oregon in 1958 was attributed to the development of latent infections because of the unusually high summer temperatures. Temperature was the limiting factor in the disease syndrome. Plants at 85° F. were infected within 24 hours of inoculation and began to wilt after 7 days. Plants kept at 65° F. and 75° F. became infected but did not show disease symptoms. The transfer of inoculated plants to 75° F. after 48 hours at 85° F. stopped disease development. After 80 hours at 85° F. the disease had developed to such an extent that transferring plants to 75° F. did not prevent symptom development and death. [From authors' summary.]—Oregon St. Coll., Corvallis.

5930. Cavazza, L., and De Benedictis, G.
Impermeabilizzazione dei tegumenti seminali ottenuta con trattamenti in acqua calda. **(Impermeability of the seed coat obtained with hot-water treatment.)** [English summary 9 lines.]
Nuovo G. bot. ital., 1959, **66**: 151-60, bibl. 20.

In trials with 12-year-old seeds of *Gleditschia triacanthos* it was found that at temperatures between 40 and 65° C. the percentage of hard seeds increased with increasing duration of immersion, reaching nearly 100%. At temperatures above 65° C. the percentage of hard seeds declined with increased length of treatment, going below the value of the control and sometimes falling to zero. This phenomenon is discussed.—Inst. Agron., Univ. Bari.

5931. Mastalerz, J. W.
Chemicals aid hydrangeas in dropping leaves.
Pa Flower Grs' Bull., 1959, reprinted in *Flor. Exch.*, 1960, **134**(16): 11.

Vapam at 9–10 ml./gal., applied at ½ pt./sq. ft. of soil under a polythene tent of 10 cu. ft. volume, completely defoliated plants in 8 days. A 1% Folex spray with Triton B 1956 spreader-sticker, applied to the foliage until run-off, resulted in 95% defoliation in 8 days. No injury occurred to plants or flower buds during storage or forcing. The Folex spray is recommended as easier to use than Vapam.

5932. Krüssmann, G.
Vorarbeiten für eine Flieder-Sichtung (Teil 1). **(The preliminary evaluation of lilac varieties. I.)**
Dtsch. Baumsch., 1960, **12**: 57-71, illus.
Notes on some 140 varieties.

5933. Rawson, T. W., and Marcussen, K. H.
Propagation of lilac.
N.Z. J. Agric., 1960, **100**: 243-4.
Notes on cuttings and rootstocks, with descriptions of *Ligustrum* spp. used as stocks for lilac in New Zealand.

5934. Pape, H.
Frühfrostschäden an Treibflieder. **(Early frost damage to forced lilac.)**
Gartenwelt, 1960, **60**: 124-5, bibl. 1, illus.
Damage was caused by a light frost in October, 1959, which followed an unusually prolonged growing season. The symptoms, which are described and illustrated, resemble those caused by *Phytophthora syringae*.

5935. Ljubčenko, V. M.
The germination of the embryo of lime and spindle trees in relation to seed stratification. [Russian.]
Bot. Žurnal, 1960, **45**: 144-8, bibl. 21.
Excised lime embryos germinated equally well whether they were taken from dry stored seeds or from stratified seeds. Spindle tree embryos, however, only germinated well from seeds that had been stratified at 0–5° C. for 30 to 90 days, during which time the seed coat cracked. [See also *H.A.*, 30: 1085.]

5936. Wyman, D.
Magnolias hardy in the Arnold Arboretum.
Arnoldia, 1960, **20**: 17-28, illus.
Species, hybrids and varieties described briefly.

5937. Straus, H.
Wartości dekoracyjne niektórych gatunków i odmian rodzaju *Malus* Mill. **(The ornamental value of some species and varieties of the genus *Malus*.)** [English and Russian summaries, 1¼ pp. each.]
Arbor. Kórnickie, 1959, **4**: 183-203, bibl. 24, illus.
Including flowering dates.

5938. Steiner, M. L.
Cultivated Philippine mussaendas.
*Amer. hort. Mag**, 1960, **39**: 98-107, illus.
Includes descriptions of 2 outstanding recently cultivated forms, *Mussaenda philippica* and *Mussaenda* "Luz" (*M. erythrophylla* × *M. philippica* var. Aurorae), and a key to aid identification of species.

5939. Beckett, K. A.
A hybrid passion flower.
J. roy. hort. Soc., 1960, **85**: 184-5, illus.
History and description of the hybrid *Passiflora* John Innes.

5940. Kollmann, R.
Untersuchungen über das Protoplasma der Siebröhren von *Passiflora coerulea.* I. Mitteilung. Lichtoptische Untersuchungen. **(Studies on the sieve tubes of *Passiflora coerulea*. I. Optical studies.)**
Planta, 1960, **54**: 611-40, bibl. 56, illus.
Microscopic studies of phloem structure.

5941. Bateman, D. F.
The influence of soil moisture on the poinsettia root rots.
From abstr. in *Phytopathology*, 1959, **49**: 533.
The rots, caused by *Thielaviopsis basicola*, *Rhizoctonia solani* and *Pythium ultimum*, were markedly influenced by soil moisture in tests where the moisture was maintained at different levels and expressed as percentages of moisture-holding capacity (MHC). *Thielaviopsis* caused appreciable damage at 33% MHC, and disease severity increased as moisture was increased up to 70% MHC; above this increases in moisture levels had no further effect. *Rhizoctonia* was most destructive at 33% MHC, and disease severity decreased as moisture was increased; above 80% MHC root rot was only slight. Root rot caused by *Pythium* was slight at 33% MHC, but disease severity increased as moisture was increased up to 95% MHC, the highest moisture level.

5942. Rhododendron-Gesellschaft, Bremen.
Rhododendron und immergrüne Laubgehölze, Jahrbuch 1960. **(Rhododendrons and evergreen woody plants, Yearbook 1960.)**
Rhododendron-Gesellschaft, Bremen, 1960, pp. 71, illus.
The yearbook includes articles on: rhododendrons and other Ericaceae in their Indian mountain home; evergreen woody plants in Bulgaria; the salt tolerance of, and water used for, rhododendrons and evergreen woody plants; and the evergreen, late-flowering wild *Rhododendron* spp. from East Asia and their use in breeding.

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* Formerly *Nat. hort. Mag.*

5943. Stoffert, G.
Das Veredeln von Azaleen. Ein Beitrag zur Arbeitsrationalisierung. **(The grafting of azaleas. A contribution to the economy of labour.)**
Gartenwelt, 1959, **59**: 449-50, 468-9, illus.

In grafting azaleas clips, which can be re-used 4 to 10 times, proved as satisfactory as, and more economical than, tying.

5944. Göttgens, E.
Untersuchungen über die Entwicklung von *Exobasidium Azaleae* Peck. und seine Infektion der Wirtspflanzen unter besonderer Berücksichtigung der gallenbildenden Wirkstoffe. **(Studies on the development of *Exobasidium azaleae* and the infection of its host plants, with particular reference to substances stimulating gall formation.)** [English summary 1 p.]
Phytopath. Z., 1960, **38**: 394-426, bibl. 24, illus.

5945. Graves, C. H., Jr., and Ashley, T. E.
Petal blight of azaleas may be controlled.
Miss. Fm Res., 1960, **23**(2): 1, 7, illus.

Of various fungicides tested to prevent infection Thylate, a formulation of thiram, at 1 lb. per 100 gal. was the most effective and was less phytotoxic than other effective fungicides. Three applications at 5- to 10-day intervals, beginning with the opening of the first flowers, are recommended. Complete coverage is essential.

5946. Weiss, F. A.
Progress in control of azalea petal blight.
Gdnrs' Forum, 1960, **3**(1): 2.

Pentachloro-nitrobenzene (PCNB), applied to control the soil-resting stage of azalea petal blight, gave promising results and did not injure the plants during soil applications. It was not satisfactory, however, as a leaf and flower spray when used alone, but a form of PCNB combined with Acti-dione, known as Acti-dione-RZ, proved very effective. Applied first as a ground spray (1 oz./sq. yd.) about 4 weeks before flowering, it was followed by treatment of the buds showing colour and of open flowers (1½ teasp./gal.) repeated at 4–5-day intervals.

5947. Hajek, J., and Krouman, J. P.
New evergreen shrub: *Viburnum pragense*, Hort.
Gdnrs' Chron., 1960, **147**: 317, illus.

Obtained by crossing *V. utile* with *V. rhytidophyllum* this new evergreen variety is extremely frost hardy and may be easily raised from green cuttings taken in late autumn.—Prague municip. Gdns.

5948. Schmelzer, K., and Schmidt, H. O.
Untersuchungen über eine Mosaikkrankheit an *Viburnum opulus* L. **(Studies on a mosaic disease of *Viburnum opulus*.)**
Phytopath. Z., 1960, **38**: 426-30, bibl. 6, illus.

Symptoms and host range.

SUB-TROPICAL FRUIT AND PLANTATION CROPS

Avocadoes.

(*See also* 4673.)

5949. Anon.
Variedades do abacateiro. **(Avocado varieties.)**
Rural, Rev. Soc. rural Bras., 1959, **39**(464): 37, illus., from *Trop. Abstr.*, 1960, **15**, Abstr. h1553.

The numerous Brazilian varieties belong to the West Indian, Mexican and Guatemalan races, the last named maturing when other fruits are not available.

5950. Oppenheimer, C.
A stock-scion trial with avocado.
Ktavim, 1960, **10**: 21-7, bibl. 2.

Observations made during the first 8 years in an experimental orchard planted with 4 varieties on 5 rootstocks are presented. The rootstocks were from seed and are very variable. Trees budded on Nabal rootstocks have given appreciably higher yields than those on Duke, Northrop, Fuerte and Benik seedlings. Nabal as a scion variety has outyielded Fuerte, Anaheim and Benik on a tree basis, but because of their smaller size the yields of Anaheim trees on an acreage basis may not be much below those of Nabal. In years of high yield the mean weight of fruit has been lower. Alternate bearing has been observed in the Nabal and Benik varieties.

5951. LaRue, J. H.
Avocado maturity tests in Tulare County.
Calif. Citrogr., 1960, **45**: 97-8, illus.

The 4 main varieties described, Bacon, Zutano, Jalna and Nowels, reached the legal minimum oil content (8%) between 23 September and 9 October, in advance of comparable varieties in southern California. The most promising varieties have so far shown no adverse effects of high summer temperatures or low winter temperatures.

5952. Oppenheimer, C.
Partial non-softening of avocado fruit.
Ktavim, 1960, **10**: 15-20, bibl. 1.

An attempt was made, during 3 seasons, to correlate non-softening [localized hard parts] of Fuerte fruits in storage with a number of orchard factors. Among the conditions which were found to be associated with a high percentage of non-softening were low yield, due to unfavourable spring temperatures or the individual fruiting habit of trees; delay in harvest; large size of fruit; non-adhering seed-coats and external spoilage. These relationships point to overripeness of the fruit at picking as a factor conducive to a high rate of non-softening. [From author's summary.]

Citrus—general.

(*See* 6082, 6301, 6313, 6332.)

Citrus—breeding, varieties and propagation.

(*See also* 6011, 6012, 6020, 6311, 6312.)

5953. FURR, J. R., AND ARMSTRONG, W. W., JR.
Breeding citrus for cold hardiness.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 66-71, bibl. 7, illus., and *Citrus Ind.*, 1960, **41**(1): 20, 22-3, 26, 30-1, 33, bibl. 7, illus.

The trifoliate orange is probably the best source of cold hardiness, but, as it and its 1st generation hybrids impart disagreeable flavours to their progeny, it is likely that many years of back-crossing and selection will be required to produce an acceptable hardy scion variety. The most promising immediate sources of hardiness are the Satsuma oranges, the Changsha mandarin and, to a lesser extent, the Dancy tangerine. Progress in breeding hardy salt-tolerant rootstocks, which are resistant to root rot, and in breeding loose-skinned types is described.

5954. MAMPORIJA, F. D.
The reproduction true to type of a vegetative hybrid in its seedling progeny. [Russian.]
Agrobiologija, 1960, No. 1, pp. 114-19, illus.

A vegetative hybrid shoot, arising from a stump of *Poncirus trifoliata*, on which an Unshiu mandarin scion had been killed by frost, retained its hybrid character when grafted on *P. trifoliata*. Neither the sexual nor the nucellar seedling progeny of this plant segregated; they had the morphological characteristics of tetraploids and cytological examination showed them to have 36 chromosomes.

5955. DŽANELIDZE, V. S., AND RAZMADZE, E. G.
First results of government variety testing of citrus. [Russian.]
Sadovodstvo, 1960, No. 2, pp. 28-31.

An evaluation of 18 orange, 12 mandarin and 9 grapefruit varieties in the Georgian S.S.R.

5956. SOOST, R. K., AND CAMERON, J. W.
Mandarin-type citrus.
Calif. Citrogr., 1960, **45**: 100, 110, 112.

The main varieties in California are described, together with preliminary observations from trial plantings of new hybrids.

5957. HARDING, P. L.
The importance and early history of the Temple orange.
Citrus Ind., 1959, **40**(12): 3, 20-1, 26, bibl. 6, illus., and *Proc. Fla St. hort. Soc., 1959*, 1960, **72**: 93-6, bibl. 6, illus.

Site of the original tree, naming and early propagation.

5958. NICHOLSON, D. J.
Nicholson tells his version of the history of the Temple orange.
Citrus Ind., 1960, **41**(5): 14, 23.

An account of its introduction from Jamaica to the United States.

5959. REECE, P. C., AND GARDNER, F. E.
Robinson, Osceola, and Lee—new early maturing tangerine hybrids.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 49-51, bibl. 4, illus.
PARKER, M. W.
Reece tells of new tangerine hybrid.
REECE, P. C., AND GARDNER, F. E.
New early maturing tangerine hybrids.
Citrus Ind., 1959, **40**(12): 22, and 1960, **41**(2): 18-19, 22, bibl. 4, illus.

See also *H.A.*, 30:2708.

5960. AIYAPPA, K. M., AND NANJAPPA, P. P.
A note on the variability in citrus.
Indian J. Hort., 1959, **16**: 184-5, bibl. 9.

Potentialities of nucellar seedlings reviewed briefly.

5961. ALI, N.
Studies on seed germination in rootstock species of citrus.
Punjab Fruit J., 1959, **22**(79): 22-32, bibl. 3.

The rootstocks investigated were rough and smooth lemon (*C. limon*), *C. karna*, sour orange (*C. aurantium*) and *C. aurantifolia*. The percentage germination was highest from sowings made in late March and early April and again in the first 3 weeks of October, being better on ridges in the spring and on the flat in the autumn. The spring germinations were higher and more vigorous but took 30 days to start compared with 14 days in autumn. The highest percentage germination was obtained with rough lemon followed by smooth lemon, *C. karna*, *C. aurantifolia* and sour orange, but *C. karna* was the most vigorous, followed by rough lemon, smooth lemon, sour orange and *C. aurantifolia*.—Punjab agric. Coll., Lyallpur.

5962. RANDHAWA, G. S., AND SINGH, J. P.
Growth response of citrus seedling rootstocks to gibberellic acid.
Indian J. Hort., 1959, **16**: 76-8, bibl. 8, illus.

Increased height, fresh weight and leaf size were recorded in seedlings of *C. limon* sprayed with GA in various concentrations ranging from 10 to 100 p.p.m., the maximum response being a 71·4% increase in height with 100 p.p.m.—Indian agric. Res. Inst., New Delhi.

5963. SINGH, R. P.
Influence of indolebutyric acid and planting time on the performance of Kagzi lime (*Citrus aurantifolia* L.) softwood cuttings.
Indian J. Hort., 1959, **16**: 79-85, bibl. 6.

The cuttings were set in a 50: 50 sand: leaf mould mixture in 3-in. pots and were kept under polythene covers in partial shade. The rainy season was much more suitable for planting out, giving 79·2% establishment, whereas in the spring the results were very poor. Late July and August cuttings showed 94–98% rooting and 84–93% establishment as against only 74% rooting and 51% establishment for early July cuttings. Treatment with IBA at up to 1000 p.p.m. was without effect.—B.R. Coll. Agric., Bichpuri, Agra.

5964. (Opitz, K. W.)
Warning on citrus budwood.
Western Fruit Gr, 1960, **14**(1): 33, illus.

Old line oranges budded on trifoliate orange or Troyer citrange rootstocks may be symptomless carriers of exocortis.

5965. Maiti, R. G., Singh, S. M., and Singh, I. J.
Effects of type of scion buds and plant regulators on the success of bud grafting in grapefruit (*Citrus paradisi* Macf.)
Indian J. Hort., 1959, **16**: 149-52, bibl. 10.

The percentage of take was significantly greater when the wood was removed from the bud in budding *C. paradisi* on *C. karna* rootstocks. Dipping the buds quickly in 50% alcohol solutions of IAA and IBA also increased take, the latter being the better of the two. The optimum concentration of IBA was 1000 p.p.m.—B.R. Coll. Agric., Bichpuri, Agra.

5966. Savage, Z.
Stocks used for citrus.
Citrus Mag., 1960, **22**(7): 10, 36.

In Florida from 1953 to 1959.

5967. Unthank, J. E.
Rootstock trials.
Citrus News, 1960, **36**: 6.

At Irymple, where 2 strains of Navel and 2 of Valencia were grafted on 8 sweet orange stocks in 1940, the Symons Washington Navel has given greater yields because of larger fruit, but the A.D. Leng Navel has produced more fruit per tree and larger trees. Of the Valencias Newton was ahead in total production. At Cobram and Murrabit, where Newton Valencia and Washington Navel on various stocks were planted in 1949–51, trifoliata has so far proved superior to all other stocks for fruit quality, and citronelle has given the highest yield and largest tree size but the lowest fruit quality. Cleopatra mandarin equalled sweet orange for quality.

5968. Hibon, J.
Le clémentinier. Quelques remarques sur sa culture, sa taille et sa fertilisation. (**Clementine oranges. Some observations on their cultivation, pruning and manuring.**)
Fruits et Prim., 1960, **30**: 3-6.

5969. Khan, M.-u.-D., and Salam, A.
Bud union in sweet orange (*Citrus sinensis*) and rough lemon (*Citrus limon*).
Punjab Fruit J., 1959, **22**(79): 45-6, bibl. 1, illus.

Little union was found in 6-month-old bud grafts of Valencia on rough lemon, and even at 1 year the union was not complete.—Punjab agric. Coll., Lyallpur.

5970. Charlu, V. S. R., and Rao, T. L. N.
Relative performance of seedling and budded trees in sweet orange and acid lime.
Indian J. Hort., 1959, **16**: 141-8.

Sweet orange trees budded on 3 rootstocks came into bearing 5-6 years before seedlings but deteriorated earlier, were more susceptible to disease and produced fruit of lower quality, although when budded on sweet orange stocks these last two defects were lessened. In acid lime, also budded on 3 rootstocks, bearing started barely one year earlier in the budded trees and there was little difference in effective life, although susceptibility to disease and the effect of budding on stocks of the same species followed the same pattern as in sweet orange.—Fruit Res. Stat., Anantharajupet, Andhra Pradesh.

5971. Majsuradze, N. I.
The acceleration of fruiting in citrus seedlings. [Russian.]
Agrobiologija, 1960, No. 1, pp. 63-6,

Methods used to accelerate fruiting were grafting shoots from the upper parts of seedlings onto the peripheral portions of the crown of Unshiu mandarin trees, planting seedlings close together in the nursery and growing them for 3 years in tubs. Seedlings grafted onto the crowns of mandarin trees fruited regularly and produced good quality fruits in the first year of fruiting.

Citrus—climate and other environmental factors.

See also (5953, 6007, 6010.)

5972. Nijjar, G. S.
An evaluation of quantitative methods for measuring cold hardiness of citrus seedlings.
Diss. Abstr., 1960, **20**: 2572-3, being *L.C. Card No. Mic.* 59-6104 of 99 pp.
Nijjar, G. S., and Sites, J. W.
Some effects of day length and temperature on cold hardiness of citrus.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 106-9, bibl. 2.
(Sites, J. W., and Nijjar, G. S.)
Dormancy is no aid to citrus seedlings in tolerating cold.
Citrus Mag., 1960, **22**(7): 16.

Eight-month-old seedlings of Key lime (*Citrus aurantifolia*), rough lemon (*C. limon*) and sour orange (*C. aurantium*) were grown for 4 weeks at

78° F. The seedlings were then divided into groups and exposed to a hardening temperature (38° F) for 10 days and/or to a freezing temperature (23° F.) for 3 hours. Of 5 criteria of possible cold hardiness tested the electrical conductivity of tissue extracts and of intact seedlings, the estimation of water-soluble proteins and the plasmolysis test did not give satisfactory results. Actual freezing tests were found to be the most reliable for measuring cold hardiness. Previous exposure to a constant low temperature of 38° F. reduced hardiness. A high day temperature of 78° F. alternating with a low night temperature of 32° F. was better for inducing hardiness than either high or low constant temperatures. Day length had no appreciable effect on hardiness at either constant temperature. With alternating high day and low night temperatures, however, the degree of cold hardiness induced was directly proportional to day length. The second paper covers similar ground, and the third is a short popular account.—Univ. Fla.

5973. COOPER, W. C.
Cold hardiness in citrus as related to dormancy.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 61-6, bibl. 16, illus., and *Citrus Ind.*, 1960, **41**(1): 3, 6, 10, 27, 34, bibl. 16, illus.

The degree of cold hardiness of trees growing under natural conditions in the field in the Rio Grande Valley of Texas was determined by the use of a portable tree freezer. The results show that approximately 6 degrees (F.) of cold hardiness can be attained in non-dormant trees by the induction of complete dormancy and lesser amounts under semi-dormant conditions. The search thus far for an effective chemical growth inhibitor or dormancy inducer has been unfruitful. 2,4-D, 2,4,5-T and Amo-1618 were more or less ineffective. Withholding irrigation water in the winter can induce dormancy and increase cold hardiness. The procedure, however, may be hazardous as citrus orchards in Texas have at times been severely injured by drought. Also, drought may possibly be broken by an untimely rain, which might result in more vigorous bud growth and less cold hardiness than in trees that had been irrigated regularly. [From author's summary.]

5974. STEWART, I., AND LEONARD, C. D.
Increased winter hardiness in citrus from maleic hydrazide sprays.
Proc. Amer. Soc. hort. Sci., 1960, **75**: 253–6, bibl. 4.
Spray with MH and help citrus trees avoid cold damage.
Citrus Ind., 1960, **41**(4): 14.
Way found to make citrus trees dormant, avoid cold damage.
Citrus Mag., 1960, **22**(6): 24.

Maleic hydrazide (1000 p.p.m.) sprayed onto orange and grapefruit trees just after they had been defoliated by cold, prevented new flushes of growth in subsequent warmer periods. Unsprayed grapefruit trees were later damaged by winter frost.—Citrus Exp. Stat., Lake Alfred, Fla.

5975. HILLINGER, C.
Formula for fighting frost.
Western Fruit Gr, 1959, **13**(10): 22-3, illus.

Methods and costs of using wind machines in citrus groves.

5976. JOHNSTON, J. C.
Treatment of frost-injured trees.
Calif. Citrogr. 1960, **45**: 118-22, and *Citrus Gr*, 1960, No. 316, pp. 13-16.

Pruning should be delayed for 6–12 months after citrus and avocado trees have been damaged by frost. Subsequent treatment should include the removal of all injured branches and the encouragement of selected shoots to replace them. Isolated areas of damaged bark should be cut out and healthy wood exposed, disinfected and painted. Irrigation and fertilization may have to be reduced in cases of severe injury, but special watch must be kept for minor element deficiences.

5977. BUCK, W. F., AND SORENSEN, H. B.
Marketing adjustments made by the Texas citrus industry to freezes of 1949 and 1951.
Mktg Res. Rep. U.S. Dep. Agric. **328,** 1959, pp. 22, illus.

A survey of the economic effects of 2 years' frosts on 51 citrus marketing and processing firms.

5978. (GARY, T.)
Plastics for growing.
Western Fruit Gr, 1960, **14**(1): 34, illus.

The use of black and clear polythene sheets for mulching and as lean-to windbreaks increased temperatures by 5–12° F. around the roots and foliage of the citrus seedlings, preventing frost damage in the winter and accelerating growth during the warmer months. Irrigation water was retained longer, the deposition of unwanted minerals in the topsoil was minimized, weed growth was discouraged and damage due to high winds was prevented.

5979. KOHL, H. C., JR.
Effect of length of photoperiod on grapefruit seedlings.
Calif. Agric., 1960, **14**(3): 8.

Increased growth was obtained by using a low intensity night light to supplement 8 hours' daylight compared with daylight alone. This was observed both at normal temperatures, i.e. warm days and cool nights, and the reverse.

Citrus—soils and nutrition.

(*See also* 4691, 5302, 6010, 6311.)

5980. Ford, H. W., and Smith, O. E.
Certain problems encountered in production of citrus on acid flatwood sands.
Citrus Mag., 1960, **22**(6): 20, 24, illus.

Poor growth and root development associated with certain soil characters, including poor drainage.

5981. Stolzy, L. H., and others.
Effect of soil management practices on infiltration rates.
Soil Sci., 1960, **89**: 338-41, bibl. 8.

In citrus orchards with a compacted soil layer due to cultural practices, the following conclusions were drawn: non-tillage improved the infiltration rates; wood sawdust and shavings mulches had no apparent effect on infiltration rates; and chiseling alone and in conjunction with fumigation had no measurable effect on infiltration rates. [Authors' summary. See also *H.A.*, 29:3954.]—Univ. Calif., Riverside.

5982. Anon.
The nutrition of citrus crops.
[*Publ.*] *int. Potash Inst., Berne*, 1959, pp. 69, bibl. 101, illus.

This comprehensive review deals with major and minor nutrients and also the application of foliar diagnosis to citrus trees.

5983. Groenewegen, H., and Bouma, D.
The chemical composition of the soil in a factorial experiment with citrus. I. Exchangeable metal cations and their effect on the cation content of citrus leaves.
Groenewegen, H., and Connor, J.
Idem. II. Extractable ammonium.
Aust. J. agric. Res., 1960, **11**: 208-22, bibl. 28, and 223-35, bibl. 16.

The application of ammonium sulphate caused a greater proportionate reduction in the exchangeable Ca of the soil than in the exchangeable K. In the 0–4-in. layer exchangeable Mg was reduced in the same proportion as exchangeable Ca, but in the 4–12-in. layer exchangeable Mg was reduced relatively more than Ca. The K content of bare soil was much lower than that of soil under a cover crop. The changes in soil composition had no appreciable effect on the cation content of the citrus leaves. In the second paper an experiment on spray irrigation in a semi-arid area is described, in which the extractable ammonium in the 0–4-in. layer of a no-tillage, bare-surface treatment persisted long after the ammonium sulphate application. Below a depth of 4 in. the extractable ammonium content was higher and the nitrate content lower in this treatment than in the tilled treatment. Nitrification appeared to be rapid in the tilled plots even when the pH was as low as 4·3.

5984. Taylor, O. C., Pratt, P. F., and Goodall, G. E.
Effects on lemon production of accumulated soil nitrogen.
Calif. Citrogr., 1960, **45**: 137, 143, bibl. 3.

In a grove of Eureka lemon on rough lemon rootstock, that had been fertilized normally for 7 years after planting, the total N in the soil was 1,320 p.p.m., the soil nitrate N content was 13 p.p.m. and the leaf N was 2·5% of the dry weight. Annual applications of 1·5 or 3 lb. N per tree for a further 6 years did not significantly affect production of lemons compared with trees which received no further N.—Univ. Calif., Riverside.

5985. Spencer, W. F.
Effects of heavy applications of phosphate and lime on nutrient uptake, growth, freeze injury, and root distribution of grapefruit trees.
Soil Sci., 1960, **89**: 311-18, bibl. 31.

Triple superphosphate plus limestone applications resulted in a considerably lower pH than the same rates of limestone applied alone. Nutrient uptake as measured by leaf and root analyses was affected by both P and lime applications. The leaf contents of P, Ca and Mn were increased, and those of K, Mg, Fe, Cu, B and Al decreased, by superphosphate applications. Limestone applications increased Ca, P and Fe, but decreased the N, K, Mn, Mg, Cu, Zn and Al in the leaves. Root composition, especially with respect to Zn and Mn, appeared to be closely related to soil pH. Trees without any source of added Ca were Ca-deficient after 5 years. [From author's summary. An account of part of this work was abstracted in *H.A.*, 29:2837.]—Citrus Exp. Stat., Lake Alfred, Fla.

5986. Anon.
Éléments mineurs nécessaires à la culture des agrumes. (**Minor elements essential for citrus crops.**)
Fruits et Prim., 1960, **30**: 17-21.

Dealing with Cu, Mn, Zn, Fe, Mo, B and S, and describing deficiency symptoms, factors affecting absorption and remedial treatment.

5987. Labanauskas, C. K., Jones, W. W., and Embleton, T. W.
Seasonal changes of micronutrients in Navel orange leaves.
Calif. Citrogr., 1960, **45**: 68, 76.

Monthly sampling showed that, in general, as leaves became older, concentrations of Mn, B and Fe increased while those of Zn and Ca decreased. Concentrations of Zn, Ca, Mn and B in the old leaves decreased during the initiation of the new bloom and growth flush in the spring. By contrast, Fe increased in concentration in the same leaves during this period, indicating that there was no appreciable redistribution of Fe to the new growth flush.—Univ. Calif., Riverside.

5988. Leonard, C. D., and Stewart, I.
Soil application of manganese for citrus.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 38-45, bibl. 13, and *Citrus Ind.*, 1959, **40**(12): 9-12, 15, bibl. 13.

Three sources of Mn were compared on acid soil. Two to 5 lb. of manganese sulphate per tree was effective, but neither manganous oxide nor manganese dioxide arrested Mn deficiency. Adding 3 lb. of calcium chloride to the sulphate increased its effectiveness. In trials on applying Mn to trees on calcareous soils 5 lb. of sulphate plus 5 lb. of calcium chloride, with or without 10 lb. of wettable sulphur, resulted in a high Mn uptake.—Citrus Exp. Stat., Lake Alfred, Fla.

5989. Aiyappa, K. M., and Subramanian, C. K.
Studies on citrus dieback disease in Coorg.
Mysore agric. J., 1959, **34**: 159-62, bibl. 4.

Of the chemicals tested fritted Cu and Sequestrene Zn caused the greatest reduction of chlorosis in 7-year-old seedling mandarins.

5990. Anon.
Como remediar la deficiencia de zinc en cítricas. (**How to remedy zinc deficiency in citrus.**)
Not. agríc. Serv. Shell Agric., Cagua, 1959, **2**: 19-20, illus.

The trees should be sprayed with zinc sulphate solution at 3 kg. to 1,000 l. of water, preferably in the late afternoon during damp weather. Neither a wetting agent nor a neutralizer proved necessary in experiments in Venezuela.

Citrus—growth and pruning.

5991. Larue, P.
Note sur la productivité du clémentinier. (**A note on the productivity of Clementines.**)
Fruits et Prim., 1960, **30**: 7-8.

If the superficial roots of Clementines are damaged by cultivation shortly before flowering, excessive production of small fruits is induced and exhaustion of the trees ensues. Where spring cultivation is unavoidable, compensatory pruning is essential. Non-tillage is strongly advocated.

5992. Erickson, L. C.
Orange leaf and fruit drop.
Calif. Citrogr., 1960, **45**: 137, 148-50, bibl. 5, illus.
Erickson, L. C., and Brannaman, B. L.
Abscission of reproductive structures and leaves of orange trees.
Proc. Amer. Soc. hort. Sci., 1960, **75**: 222-9, bibl. 11.

Leaves and flowers or fruitlets were picked up daily from beneath 5 Washington Navel and 5 Valencia 22-year-old orange trees. The total average leaf drop per tree in 1 year was 63,290 leaves from the Navels and 39,637 leaves from the Valencias. The heaviest leaf drop was during the bloom period, when on one day the Navels lost 3,268 and the Valencias 1,475 leaves per tree. Leaf drop was low from May to September. Of all the flower buds produced, 48·5% in the Navels and 35·5% in the Valencias fell before they opened. Thinning of small fruits progressed until only 0·2% of all the Navel flower buds remained as fruit. In the Valencia trees 1·1% of the flower buds produced mature fruit.—Univ. Calif., Riverside.

5993. Khan, D. A.
Germination trials on mandarin pollens.
Punjab Fruit J., 1959, **22**(79): 37-42, bibl. 5. illus.

Glucose solution (5–10%) proved the most suitable medium for germinating the pollen of 8 mandarin varieties.

5994. Iwasaki, T.
Studies on the control of alternate bearing in citrus. I. The effects of green wood pruning on the development of flowers and shoots.
[Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1959, **28**: 297-305, bibl. 30, illus.

Results of observations made from 1936–38 to 1953–55 showed that cutting branches back to 1, 2 or 3-year-old wood decreased the number of flowers and shoots and also shoot vigour in the following spring. The more severely the branches were cut back, the stronger was the inhibitory effect. When cutting back was severe enough to reduce the number of flowers by one third, it increased the growth of shoots. Cutting off all 1-year-old branches, without cutting 2-year-old branches, induced more vigorous growth of shoots than when 2-year-old branches were cut. No seasonal effects of pruning were noticed when it was done between November and March.

5995. (Moore, P.)
Citrus pruning effects.
Western Fruit Gr, 1959, **13**(9): 26.

Four pruning treatments were compared with no pruning in a Navel orchard. All types of pruning resulted in increases in yield and fruit size, and in reductions in spray material needed.

5996. Krezdorn, A. H., and Jutras, P. J.
Small power tools for pruning citrus.
Citrus Ind., 1959, **40**(12): 5-7, 14-15, bibl. 3, illus.

Several petrol driven, electric and compressed air tools are described and illustrated. Petrol driven tools will cut through large limbs quickly, are dependable and will cut in a narrow crotch angle, but are excessively heavy and will not cut small branches. Electric tools are lighter and some types will cut limbs of 4–6 in. diameter, but they must be used with great care and are not suitable for narrow crotch angles. Compressed air circular saws are much lighter than electric ones, but a suitable compressor is more expensive than a generator.—Citrus Exp. Stat., Lake Alfred, Fla.

5997. DICKINSON, T. A.
Machine pruning boom.
Western Fruit Gr, 1959, **13**(8): 23-4, illus.

Various mechanical devices for lopping and hedging lemons described.

5998. ANON.
Kimball's Whirlybird.
Western Fruit Gr, 1959, **13**(11): 30, illus.

A tractor-drawn topping rig, with an automatic levelling device, capable of topping 2 acres of citrus and deciduous fruit trees per hour.

5999. (WEAR, S.)
Pruning with a chemical.
Western Fruit Gr, 1959, **13**(12): 30, illus.

Maleic hydrazide at 500 p.p.m. was sprayed onto 2 groups of lemon trees, one of which had had the suckers pruned and the other suckers left unpruned. No substantial difference in behaviour was observed during the following 6 months. The spray did not kill suckers on the unpruned trees but caused the tips to turn yellow and stop growing. It did not harm older leaves or limbs or cause fruit drop.

Citrus—fruit thinning, development and composition.

(*See also* 5303, 5992.)

6000. SAITO, Y., YAMAMOTO, S., AND NAKAMURA, M.
Studies on fruit thinning of citrus fruit by chemicals. II. Thinning effect of hormones on *Citrus unshiu* Marco. [Japanese, with English summary ½ p.]
Bull. Fac. Agric. Univ. Miyazaki, 1959, **5**: 36-52, bibl. 22, illus.

2,4,-5TP, MH 30 and 2,4-D had undesirable effects on leaves and fruits. NAA applied at full bloom prevented young fruits dropping by inhibiting the development of an abscission layer. Later applications of NAA, however, had a thinning effect.

6001. SCHROEDER, C. A.
Aspects of citrus fruit growth studied in tissue cultures.
Calif. Agric., 1960, **14**(4): 10-11, illus.

A brief general outline mentioning various aspects of tissue culture which may help in interpreting fruit growth in the orchard.—Univ. Calif., Los Angeles.

6002. HARDING, P. L., SUNDAY, M. B., AND DAVIS, P. L.
Seasonal changes in Florida tangelos.
Tech. Bull. U.S. Dep. Agric., agric. Mktg Serv., **1205**, pp. 47, bibl. 21., illus., and *Citrus Ind.*, 1960, **41**(1): 12-14, 16, 18, 20, bibl. 21.

Of the 4 varieties studied Orlando reached maturity first and Seminole last; Thornton and Minneola were intermediate. Early season fruit should have a minimum of 9% total solids and a minimum solids : acid ratio of 10 : 1. As the season progressed the minimum total solids : acid ratio increased. The weight of total soluble solids increased and the weight of total acid decreased during the marketing season. The ascorbic acid concentration did not fluctuate during the season. Active acidity gradually decreased with ripening. Variation associated with rootstock was not as pronounced as that associated with variety. For Orlando tangelos total solids, total acid and palatability ratings were higher in fruit from trees on Cleopatra rootstocks than on others such as rough lemon. Yearly variations in fruit characteristics were associated with rainfall. Orlando, Minneola and Seminole tangelos resemble the tangerine parent in total solids content, ascorbic acid concentration, active acidity and rind colour. Thornton tangelo resembles the grapefruit parent in these characters.

6003. SAMSON, J. A.
Over de rijping van citrusvruchten in Suriname. **(The ripening of citrus fruits in Surinam.)** [English summary ¼ p.]
Surinaam. Landb., 1959, **7**: 103-10, bibl. 4.

Analyses were made of Kwatta 202 and Valencia oranges and of grapefruit grown in Surinam to determine the contents of juice, soluble solids and citric acid and the Brix/acid ratio at various dates. It is concluded that rigid adherence to maturity standards is necessary at the beginning and end of the harvest season, if export quality is to be maintained.

6004. KHAN, M. A.
A note on fruit ripening studies in sweet lime (*Citrus aurantifolia* Swingle).
Punjab Fruit J., 1959, **22**(79): 33-4.

The ratio of total soluble solids to acidity was greatest in February, although acidity was lowest in April.

6005. KEFFORD, J. F.
The chemical constituents of citrus fruits.
Reprint from *Advances in Food Research*, 1959, **9**: 285-372, bibl. 18 pp.

In addition to detailed accounts of the numerous separate constituents, the effects of various environmental and other factors on composition are discussed.—C.S.I.R.O., Homebush, N.S.W.

6006. HUGGART, R. L., AND OTHERS.
Comparison of characteristics in commercial aqueous extracts of orange pulp produced from midseason and late summer fruit. I. Introduction and some characteristics in aqueous extracts of orange pulp.

Rouse, A. H., Atkins, C. D., and Moore, E. L.
Idem. II. Pectic substances and related characteristics in aqueous extracts of orange pulp. III. Microbiological characteristics in aqueous extracts of orange pulp.
Wenzel, F. W.
Idem. IV. The use of aqueous extracts of pulp in the production of frozen orange concentrate.
Proc. Fla St. hort. Soc., 1959, 1960, **72**: 221-7, bibl. 4, 227-33, bibl. 8, 233-5, bibl. 4 and 235-9, bibl. 5, and *Citrus Ind.*, 1960, **41**(3): 5, 7, 9, 11, 13, **41**(4): 3-4, 6-7, 9, **41**(4): 5-6 and **41**(5): 5-7, bibls.

6007. Mosqueira, A., Pazos, L. R., and Cruz, N.
Determinación de vitamina C en agrios helados. **(Determination of vitamin C in frost-damaged citrus fruits.)**
Farmacognosia, 1959, **19**: 321-32.

Frost considerably reduced the vitamin C content, which showed a low correlation (particularly in lemons) with fruit density, and a somewhat higher correlation with the ratio of juice volume to pulp diameter.

6008. Weerakoon, A. H.
Composition of the seed fat of Ceylon sweet orange.
J. Sci. Food Agric., 1960, **11**: 273-6, bibl. 7.

In *Citrus aurantium dulcis* fatty oil comprised 33% of the dried whole seed. The principal fatty acids were palmitic (21·8%), oleic (27·4%) and linoleic (34·2%), all by weight. The fat consisted chiefly of monosaturated-diunsaturated (54%) and disaturated-monounsaturated (22%) glycerides.—Inst. sci. indust. Res., Colombo, Ceylon.

6009. Horowitz, R. M., and Gentili, B.
Flavonoid compounds of citrus. III. Isolation and structure of eriodictyol glycoside.
J. Amer. chem. Soc., 1960, **82**: 2803-6, bibl. 18.

From lemon peel; its structure is eriodictyol 7-β-rutinoside.

Citrus—diseases.

(*See also* 6024, 6025, 6047, 6048.)

6010. del Rivero, J. M.
Influencia de los estados deficitarios en el desarrollo de las plagas y enfermedades de los agrios. **(The effects of host deficiencies on the development of pests and diseases in citrus.)**
An. Inst. nac. Invest. agron. Madrid, 1959, **8:** 865-72, bibl. 22.

This review of recent work in California, Florida, Israel and Italy covers the effects of nutritional deficiencies and excesses, nutrient spray residues and dust from roads on the incidence of diseases and pests of citrus.

6011. Phadnis, N. A.
A note on the decline of the mandarin orange *(Citrus reticulata)* in the Nagpur region.
Poona agric. Coll. Mag., 1959, **50**: 148-51, bibl. 6.

It is suggested that the growing of virus-free nucellar seedlings for propagation as bud grafts may control mandarin decline.

6012. Rossetti, V.
Transmissão de doenças de virus dos citrus por enxertia. **(Transmission of virus diseases of citrus by grafting.)**
Biológico, 1959, **25**: 203-11.

Psorosis, affecting sweet orange, tangerine, grapefruit and Tahiti lime, is controlled by taking budwood from virus-free plants over 15 years old. The lives of affected trees can be prolonged by scraping away infected tissues and disinfecting the wounds with bordeaux paste, or in cases of mild infection the bark can be removed by local applications of 1% dinitrocyclohexylphenol in kerosene (DN 75). The measures recommended for control of exocortis of trifoliate orange and Rangpur lime are selection of budwood from healthy trees at least 8 years old and inarching with tolerant rootstocks, such as the Caipira orange and Cleopatra mandarin, when young trees are mildly infected. In older trees the trunk should be cleaned and its base treated with a copper fungicide. Adequate fertilizing has frequently revived affected trees. Where xyloporosis is concerned (affecting Persian lime, tangelo and Rangpur lime) the trees providing budwood should be disease-free and at least 4 years old, and inarching with tolerant rootstocks is advised.

6013. Rossetti, V., Fassa, T. G., and Musumeci, R. M.
Um novo ácaro dos laranjais paulistas. **(A new mite in the S. Paulo orange groves.)**
Biológico, 1959, **25**: 273-5, bibl. 16, illus.

Sweet-orange attacked by leprosis (psorosis) were found to be infested by *Brevipalpus phoenicis*. Control experiments in Florida are quoted [see *H.A.*, 29: 3979]. The fact that sulphur will control both the mite and leprosis suggests that the mites either transmit the virus or cause the lesions directly by their toxic saliva. The acaricide Kelthane W has given good control of leprosis in Brazil.

6014. Herrero de Egana, M.
L'orthocide dans les orangers atteints de psorosis. **(The use of Orthocide to control psorosis in orange trees.)**
Fruits et Prim., 1959, **29**: 208-9.

Orthocide 50 was applied in 5% solution after scraping off the rough bark, first in spring when the sap was rising and again at the end of August. The result was the almost complete disappearance of symptoms and a marked stimulation in growth of foliage. No explanation is suggested.

6015. GRANT, T. J.
Tristeza virus strains in relation to different citrus species used as test plants.
Phytopathology, 1959, **49**: 823-7, bibl. 15, illus.

Lime, orange, lemon and grapefruit plants were inoculated with 3 strains of tristeza virus. Differences in symptom expression were found to be related to the citrus species inoculated and the virus strain employed. Key lime was the best plant for detecting tristeza virus strains and strain mixtures.—U.S.D.A., Orlando, Fla.

6016. KIKAČEJŠVILI, Z. N.
The effect of some chemical elements on the anatomical structure of lemon and its susceptibility to mal secco. [Georgian, with Russian summary.]
Tr. In-ta Zašč. Rast. AN Gruz SSR, 1957, **12**: 137-52, from *Ref. Ž.* (*Biol.*), 1958, No. 21, Abstr. 96,302.

Of 14 compounds tested on the susceptible Novogruzinskij lemon only $FeSO_4$ induced resistance.

6017. COHEN, M.
Timing of sprays for control of greasy spot disease of citrus.
From abstr. in *Phytopathology*, 1959, **49**: 536.

Sprays applied to immature flushes are much less effective than sprays applied after the flush has fully expanded. Commercially effective sprays may be applied over an extended period from shortly after the time of flush expansion to 2 months or more thereafter. Copper-containing sprays appear to be the most effective. Less control has been obtained with Dyrene, Niacide Z, zineb, Phaltan and a number of other organic fungicides. Oil sprays have given fair control but may reduce yield. [See also *H.A.*, 30: 4330.]

6018. KHAN, I. U.
***Fusarium* wilt of citrus nursery plants.**
Punjab Fruit J., 1959, **22**(79): 35-6.

Controlled by drenching the soil with 2% formalin at ½ gal. per sq. ft. before sowing and by spraying with 2: 2: 50 bordeaux monthly after emergence.

6019. ANON.
El tratamiento de la gomosis en cítricas. (**Treatment of gummosis in citrus.**)
Not. agríc. Serv. Shell Agric., Cagua, 1959, **2**: 15-16, illus.

Prevention and cure by sanitation, surgery and fungicidal treatment.

6020. LEIN, H.
Protecting roots from fungi.
Western Fruit Gr, 1959, **13**(11): 23-4, illus.

Citrus varieties which are susceptible to *Phytophthora parasitica* and *P. citrophthora* may be protected by treatment of seed-beds, nursery and planting sites with Vapam (1 pt./50 sq. ft.) or Mylone (800 lb. 50% mixture with bran/acre), both of which should be watered in to a depth of 3 or 4 ft. Citrus seed may be disinfected by treatment in hot water at 120° F. for 4 minutes, and seedling roots may be immersed in water at 48° C. for 10 minutes to destroy *P. citrophthora* but not *P. parasitica*. To prevent reinfestation contaminated irrigation water should be treated with chlorine or copper sulphate sprays. A promising degree of resistance to these fungi is shown by the Ichang pumelo and by Argentinian and New Mexican varieties of trifoliate orange.

6021. KLOTZ, L. J., AND OTHERS.
Growth of Navels on Troyer improved by disinfesting planting site.
Calif. Citrogr., 1960, **45**: 173, 179, illus.

Treatment of *Phytophthora*-infested planting sites on old citrus soils with Mylone 85% at 9 oz. per basin of 50 sq. ft., or with Vapam at 1 pt. per basin, increased girth after 437 days by 74%. Recontamination is prevented by excluding run-off water from the basins and by dusting the basin surface with a neutral copper spray material.—Univ. Calif., Riverside.

6022. TSAO, P. H.
***Phytophthora* fibrous root rot of citrus affected by soil factors.**
From abstr. in *Phytopathology*, 1959, **49**: 553.

The disease potential of *Phytophthora parasitica* was usually higher in soils in wet irrigation furrows than in the drier, unirrigated regions under the trees. The soil under the trees had a lower pH, higher salinity, lower *Phytophthora* and higher total fungal populations than the furrow-bottom soil. Reduction in the growth of sweet orange seedlings in artificially infested soils was greater in steamed furrow-bottom soil than in steamed soils from under the trees, and was greater with steamed than with unsteamed soils. Soil pH studies showed the soil under the trees (pH 5) was too acid for optimal *Phytophthora* infection. *In vitro* inhibition tests with fungus isolates commonly found in soil under the trees showed that many were antagonistic to *Phytophthora* spp.

6023. STOLZY, L. H., AND OTHERS.
Influence of irrigation on *Phytophthora* root rot.
Calif. Citrogr., 1960, **45**: 66, 76, bibl. 3.

Inoculation of potted sweet orange seedlings with *P. parasitica* and *P. citrophthora* reduced shoot growth and girth increments. Treatments which involved heavy irrigation at 9 centibars grew larger plants with healthier roots than treatments which involved irrigation at 60 centibars.—Univ. Calif., Riverside.

Citrus—pests.

(*See also* 5188, 6010, 6013.)

6024. Johnson, R. B., Thompson, W. L., and Simanton, W. A.
Citrus insect control—spring 1960.
Citrus Ind., 1960, **41**(2): 3, 6, 22.

Spray recommendations for control of melanose, scab, greasy spot, rust mite, broad mite, scale insects, mealy bugs and spider mite.

6025. Oliff, K. E., and McQueen, A.
Soil fumigation is possible solution to replant problem.
Citrus Gr, 1960, No. 315, pp. 7-11, illus.

Trials are in progress in South Africa using DD injected by a tractor-drawn applicator with a flow regulator.

6026. Mariconi, F. A. M.
Dois novos insetos em laranjeira. **(Two new insect pests of orange trees.)**
Biológico, 1959, **25**: 244-9, bibl. 9, illus.

A bug, *Crinocerus sanctus*, appears to have spread to citrus trees from leguminous fodder and cover crops. Various insecticides are under investigation for its control, and one which has proved effective is parathion. *Cyclocephala melanocephala*, a beetle pest of lilies and other ornamental plants, has also spread to citrus trees. The insecticides which have given the best control to date are wettable powders of 0·15% DDT at 300 g./hl., 0·05% diazinon at 125 g./hl., 0·1% malathion at 400 g./hl. and 0·015% parathion at 150 g./hl.

6027. N.S.W. Department of Agriculture, Entomological Branch.
Control of the Queensland fruit fly, *Dacus (Strumeta) tryoni.*
Agric. Gaz. N.S.W., 1960, **71**: 72 + coloured plate.

Control is compulsory.

6028. Atkins, E. L., Jr.
Citrus looper.
Calif. Citrogr., 1960, **45**: 133-4, bibl. 5, illus.

A 99% reduction of *Anacamptodes fragilaria* achieved in 7 days by dusting Navel orange trees with 5% DDT at slightly over 2 lb./acre.

6029. Atkins, E. L., Jr.
Cabbage looper in citrus.
Calif. Citrogr., 1960, **45**: 154-6, illus.

Parathion at 2 lb. 25% w.p./100 gal. water or DDT at 2 lb. 50% w.p./100 gal., applied as full coverage sprays and repeated every 10–14 days, gave satisfactory commercial control of *Trichoplusia ni*.

6030. Bitancourt, A. A.
O combate aos ácaros dos citrus pelos ditiocarbamatos. **(Mite control on citrus by dithiocarbamates.)**
Biológico, 1959, **25**: 227-32, illus.

Since the extended use in São Paulo of dithiocarbamates for rust mite control, oranges have been affected by star spot, probably caused by another mite, *Gamasus* sp., and grapefruit by contact spot, caused by certain insects or mites. Applications of sulphur, combined or alternating with those of dithiocarbamates, are recommended.

6031. Costa, A. S., Moreira, S., and Mariconi, F. A. M.
Ocorrência do ácaro das gemas em plantações citrícolas de São Paulo. **(The occurrence of the bud mite in citrus orchards of São Paulo.)** [English summary ½ p.]
Biológico, 1960, **26**: 21-6, bibl. 5, illus.

Aceria sheldoni has been identified on citrus (sweet orange and grapefruit) trees in São Paulo, Brazil. Control measures are being applied as in California.

6032. Anon.
El combate de las escamas en cítricas. **(Control of scale insects on citrus.)**
Not. agríc. Serv. Shell Agric., Cagua, 1959, **2**: 9-11, illus.

Including recommended combined treatment against scales, ants and aphids.

6033. Johnston, C. J. R.
Red and other scale pests of citrus.
J. Agric. Vict., 1960, **58**: 163-9, illus.

98·8% control was obtained on Valencia oranges by the application of Rogor 40 at 1 pt./100 gal. on December 1, and at 2 pt./100 gal. on March 17. Gusathion, malathion and Metasystox were slightly less effective.

6034. Johnston, C. J. R.
Red scale. Control results with newer insecticides compared with fumigation and white oil.
Citrus News, 1959, **35**: 127, 131.

A general review, outlining control measures from the 19th century to the present day. Recently proved scalicides are Gusathion 25% w.p. at 2½ lb./100 gal. and Rogor 40 at 1 pt./100 gal.

6035. N.S.W. Department of Agriculture, Entomological Branch.
Insect control—red scale, *Aonidiella aurantii.*
Agric. Gaz. N.S.W., 1960, **71**: 128, illus.

Current recommendations for 1 or 2 spray applications.

6036. Martin, B. H., and Black, R. F.
Heat treatment of citrus for control of red scale. 1. Trials on Washington Navel fruit in a dehydrator.
Aust. J. agric. Res., 1960, **11**: 197-207, bibl. 9.

Counts of the living and dead scales on freshly picked Washington Navel fruit were made 3 weeks after heat treatment. Complete control was obtained with treatments at 70° C. for 1 hour and at 50° C. for 2¼ hours, although at 70° C. fruit damage occurred. No damage occurred during treatment at 50° C. Raising the R.H. from 12 to 40% did not alter the time required for 50% or 100% scale mortality.

6037. Vergani, A. R.
Ensayos de fitotoxicidad en citrus con distintos tipos de aceites minerales insecticidas. **(Trials on the phytotoxicity to citrus of different types of insecticidal mineral oil.)**
Rev. Invest. agríc. B. Aires, 1959, **13**: 117-44, bibl. 10.

Twenty-three light, medium or heavy oils were applied to 2 mandarin varieties, Lue Gim Gong sweet orange and Marsh Seedless grapefruit after flowering, in late spring, in mid-summer or in early autumn. The treatments, which proved harmless, were as follows: for Común de Concordia mandarin, January-February (summer) application of a medium oil of USR 80%; for Campeona mandarin, a light oil of USR 83% in February or March; for Lue Gim Gong orange, a medium oil of USR 81% in December, February or March; and for Marsh Seedless grapefruit, a medium oil of USR 87·5% in summer or early autumn (January-March). Several other promising oils are mentioned for the orange and grapefruit varieties, the latter being the least, and mandarins the most, susceptible to oil damage. —Estac. exp. Agropec., Concordia, Entre Ríos, Argentina.

Citrus—fruit harvesting, handling and uses.

(*See also* 4738, 6006, 6036, 6300.)

6038. (Coppock, G. E., and Jutras, P. J.)
Picking spindle.
Amer. Fruit Gr, 1960, **80**(3): 30, illus.

A mechanical harvesting assembly for citrus has been developed at the University of Florida Citrus Experiment Station. It consists of a pair of 24-in., hydraulic-powered, tapering spindles each with a wide rubber thread. As the spindles pass through the tree they rotate and gently pull each fruit until it becomes detached. It is then conveyed along the rotating flanges to a container. The spindles are reversed as they are withdrawn from the tree to prevent damage to the foliage.

6039. Botham, J. R.
Bulk handling citrus fruits.
J. Agric. S. Aust., 1960, **63**: 287-93, illus.

Photographs and notes describing the handling of 25 and 50 bu. bins on trailers and by fork-lifts.

6040. Minor, R. J.
More citrus going into bins.
Western Fruit Gr, 1959, **13**(9): 21-2, illus.

Hardboard bins, 48 × 48 × 30 in., lifted by tractor-mounted boom hoists.

6041. Bilbo, B. C.
Bulk bin cooling of oranges in storage rooms.
Calif. Agric., 1960, **14**(3): 5, illus.

Four types of bulk bin were compared with field boxes in tests in 3 rooms with different cooling capacities. Cooling in the centre of a bulk bin took twice as long as in the centre of a pallet load of field boxes. Bins with slotted sides cooled 10–15% more quickly than bins with closed sides, and a bin 30 in. deep took 20% longer to cool than one 24 in. deep.

6042. Kalmar, A. F.
Wax coating preserves citrus for the market in field-fresh condition.
Citrus Gr, 1960, No. 316, pp. 7-11, illus.

Describes the "Flavorseal" technique and machinery.

6043. Davis, P. L., and Harding, P. L.
The reduction of rind breakdown of Marsh grapefruit by polyethylene emulsion treatments.
Proc. Amer. Soc. hort. Sci., 1960, **75**: 271-4, bibl. 6, and *Citrus Ind.*, 1960, **41**(2): 24, 26, bibl. 6.

Rind breakdown, or pitting, of grapefruit was reduced substantially by treatment with emulsions of polythene before storage. Treated fruit retained normal colour and developed no off-flavours or differences in chemical composition of the juice due to polythene treatment. Of the two emulsion formulations tested polythene-oleic acid-morpholine was found to be superior to polythene-Tergitol NPX-potassium hydroxide. [Authors' summary.]

6044. Botham, J. R.
Report on sterilisation and storage trials and other work to Mildura citrus field day.
Citrus News, 1959, **35**: 133, 138.

Trials over 2 years have shown that penicillium moulds in citrus can be as well controlled by a 2% sodium *o*-phenylphenate dip (SOPP) plus a wax as by diphenyl wraps, provided that the concentration of SOPP is at least 0·5%. Storage spot in Washington Navels was much better controlled by diphenyl wraps than by SOPP wash-wax. Pilot trials have indicated that the inclusion of a case-liner impregnated with 9 g. diphenyl prevents fungal sporulation. Storage trials over 3 seasons have shown that Valencias harvested in early December may be kept for at least 3 months at 40° F., when the fruit is wrapped in good quality diphenyl wraps or treated with SOPP as above. Fruit setting trials in Navels during 2 seasons have shown that 0·1% DDT applied at 5% blossom, with or without a further application at 100% blossom, increased yields by 50%.

6045. Tindale, G. B.
Storage trials with Valencias at 42° F.
Citrus News, 1959, **35**: 144.

Diphenyl wraps, borax and SOPP all reduced mould wastage but did not give complete control.

6046. Levitt, E. C., and Long, J. K.
Sterilising—need for full 2-minute dip in SOPP tank.
Citrus News, 1959, **35**: 145.

Investigations showed that, when sodium orthophenyl-phenate (SOPP) is used in combined wash-sterilising tanks, the fruit should be dipped for 2 minutes to allow the chemical to penetrate rind injuries and kill developing mould within the tissues. SOPP can disinfect injuries up to 4 days old in the winter and up to 36 hours old in summer. It is also an effective cleaning agent, and its use is essential when treating fruit heavily infected with sooty mould.—N.S.W. Dep. Agric.

6047. Christ, R. A.
Effect of sodium carbonate on black spot development in harvested citrus fruits.
S. Afr. J. agric. Sci., 1959, **2**: 575-7.

Partially effective at 5% in controlling *Phoma citricarpa* on lemons and Washington Navels.

6048. Beraha, L., and others.
Studies on control of stem end rots of oranges with gamma radiation.
From abstr. in *Phytopathology*, 1959, **49**: 534.

Florida Valencia oranges were inoculated with *Diplodia natalensis* and *Phomopsis citri*, irradiated and held at 70–75° F. for 23 days. At least $2 \cdot 75 \times 10^5$ rad was necessary for appreciable curtailment of *Diplodia*, and this dosage was about the threshold of injury to the fruit. With *Phomopsis* $1 \cdot 15 \times 10^5$ rad prevented decay for 23 days.

6049. Grierson, W., and Newhall, W. F.
Degreening of Florida citrus fruits.
Bull. Fla agric. Exp. Stats **620**, 1960, pp. 80, bibl. 102, illus.

Three types of degreening room are described: slatted-floor rooms, solid-floor rooms (both for fruit in boxes) and degreening bins in which the fruit is handled in bulk. In all these it is recommended that air be conditioned to approximately the following conditions: 85° F. dry bulb temperature, 82–83° F. wet bulb temperature; ethylene delivery at 1 bubble per minute per 10-box capacity. Adequate air movement necessitates a fan capacity of 7·5 to 10 cu. ft./min. per 1-box capacity (1 box = 2·232 bu.) Ventilation to prevent CO_2 accumulation should be either a continual intake of approximately 2% of the total volume of the room per minute, or else a complete airing twice daily. [From authors' summary.] The literature on the effects of orchard factors, pests and diseases on degreening is reviewed.

6050. Clark, R. B.
Cartons.
Citrus News, 1960, **36**: 9, 14-15.

Compared with the wooden box, cartons have reduced packing, handling and transport costs.

6051. Reid, I. A.
Rapid-pack demonstration.
Citrus News, 1960, **36**: 26.

Faster and cheaper in fibreboard than in wooden cases.

6052. Grierson, W.
How to hold quality in poly.
Reprint from *Produce Mktg*, February 1960, pp. 3, illus.

Hydrocooling with the addition of Dowicide A, and the use of diphenyl pads have markedly reduced storage and transit losses in Florida citrus packed in polythene bags. Air cooling and Dow-hex dipping resulted in even lower losses, but at higher cost. [See also *H.A.*, 29: 1852.]

6053. Ting, S. V., and Deszyck, E. J.
Determination of mixture of Red No. 32 and Citrus Red No. 2 dyes on oranges.
Citrus Mag., 1960, **22**(5): 18, 30, bibl. 4.

Methods of detecting illegal contamination.

6054. Smith, E. H. G., and Kay, D. E.
The utilisation of citrus fruit.
Seymour, J. W.
Addendum.
J. Sci. Food Agric., 1960, **11**: 181-8, bibl. 18, and 189-91.

A review covering juice products, canned segments, marmalade and by-products, including essential oils, pectin, candied peel and dried pulp. The article deals with world-wide utilization, whereas the addendum deals more specifically with uses in Britain.

Dates.

6055. Toupet, C.
L'extension récente des palmeraies au Tagant. (**The recent extension of the [date] palm groves of Tagant [Mauretania].**)
Notes afr., 1959, No. 84, pp. 103-6, bibl. 7.

Expansion since 1900.

6056. (Nixon, R. W.)
Gibberellin promising on dates.
Western Fruit Gr, 1960, **13**(2): 50, illus.

GA may be useful in lengthening fruit stalks [see also *H.A.*, 30: 1191.]

Litchis.

6057. Jain, N. L.
A note on drying of litchi.
Indian J. Hort., 1959, **16**: 183.

Fruit that was washed, blanched in boiling water (5 min.) or steam (15–20 min.) and treated with 2% potassium metabisulphite for 48 hours and then sun dried preserved its internal colour and external attractive appearance.—Indian agric. Res. Inst., New Delhi.

Olives.

(*See also* 4691, 6280.)

6058. Goor, A., Spiegel, P., and Gratch, H.
The olive. [Hebrew, with English summary 3 pp.]
State of Israel Ministry of Agriculture, 1960, 9½ × 7 in., pp. 163, bibl. 73, illus.

A review of the history, botany, propagation and management of the olive tree, together with information concerning the main varieties and the most suitable climatic conditions.

6059. Louvrier, J.
L'olivier: son agronomie—positions actuelles. (**The present situation regarding olive agronomy.**)
Tunisie agric., 1959, **60**: 105-22, bibl. 19.

The subjects discussed are: sterility due to ill health, malformation of the reproductive organs or climatic causes; pruning, particularly the Sfax goblet method; planting and soil conservation techniques; and nutrition.

6060. Jacoboni, N.
Nuove direttive per l'olivicoltura specializzata. (**New trends in specialized olive growing.**) [French summary ¼ p.]
Frutticoltura, 1960, **22**: 113-22, bibl. 14, illus.

To meet the increasing demands for low bush, and particularly palmette, types of olive tree, material selected for propagation must exclude varieties with a tendency to vertical growth. For the hedge system of training, varieties with pendulous branches are suitable. Under favourable conditions in the Chianti province olive groves under the new palmette system began fruiting after only 2 years' growth, one important feature for success being mild winters. The use of wild or semi-wild rootstocks and the introduction of mist propagation have greatly widened the scope for olive growing in Italy, and cuttings have produced higher yielding trees than certain graft combinations. Training of palmette forms is begun early by supporting the main inclined branches with poles intersecting to form an X and the central axis (where this is left) with a vertical pole.

6061. Anon.
L'olivo a palmetta. (**Palmette-trained olive trees.**)
Ital. agric., 1960, **97**: 357-60, illus.
The method of training briefly described.

6062. Armenise, V.
Ritmo comparato dell'accrescimento vegetativo di *Olea europaea* L. a Bari ed a Firenze nel 1957. (**The comparative rhythm of vegetative growth in olives at Bari and Florence in 1957.**) [English summary ¼ p.]
Nuovo G. bot. ital., 1959, **66**: 161-74, bibl. 6, illus.

Spring cambial growth began at the beginning of April in Bari, i.e. about a month earlier than in Florence. In Florence, however, spring growth was stronger, and autumn growth occurred more frequently, than in Bari. Spring growth normally proceeds in a series of discontinuous phases, but under certain climatic conditions it becomes almost continuous in Florence and, to a lesser extent, in Bari. Histologically abnormal wood is produced when growth starts unduly early or continues unduly late.—Ist. Bot., Univ. Bari.

6063. Gorter, G. J. M. A.
Control of anthracnose in olives.
Fmg S. Afr., 1960, **36**(3): 18-19, 22, 24, illus.

Symptoms, varietal susceptibility and control of the disease caused by *Gloeosporium fructigenum* f. *chromogenum* are described. All infected fruit, dead branches and shoots should be destroyed before the winter rains, and at least one winter spray of 4: 4: 50 bordeaux mixture applied. If the disease is very severe, further application of 4: 4: 100 bordeaux should be applied, first when 75% of the corollas have dropped, again when the fruit is half developed and a third time when it is fully developed but before it loses its green colour.

6064. Orphanidis, P. S., Phytizas, E. A., and Tsakmakis, A. A.
Quelques observations sur l'intensité de l'attaque du dacus, en fonction du degré de maturation de l'olive. (**Notes on the varying intensity of attack by the olive fly according to the degree of ripening in the fruit.**)
Ann. Inst. phytopath. Benaki, 1959, **2**: 144-8, bibl. 6.

Observations show that early ripening may prove a useful factor in preventing olive fly punctures.

6065. Orphanidis, P. S., and others.
Recherches expérimentales concernant l'efficacité comparée de certains insecticides phosphorés sur le dacus de l'olive, effectuées en 1958. (**Experiments carried out in 1958 on the comparative efficacy of certain phosphoric insecticides against the olive fly.**)
Ann. Inst. phytopath. Benaki, 1959, **2**: 43-101, bibl. 28.

A detailed account of the work at Itea shows considerable difference in efficacy as between different products. Rogor in emulsified and wettable form and Dimecron 20, Fac 20, and Shg 1496 in liquid and wettable forms proved best. The second most important group, significantly inferior to the above, contained Ekatin, Ekatin M and diazinon. Others, including Dipterex and weak solutions of Ekatin, were inferior. [For earlier work see *H.A.*, 29: 4007.]

6066. Orphanidis, P. S.
Observations sur la diminution du nombre des piqures du dacus en fonction de l'action résiduelle sur les adultes, d'après les expériences de 1958. **(Notes on the decrease in olive fly punctures in relation to residual insecticidal action in the 1958 tests).**
Ann. Inst. phytopath. Benaki, 1959, **2**: 131-43, bibl. 12.

The late application of certain phosphoric insecticides resulted in a considerable decrease in olive fly punctures. This indicates that the efficacy of their action was due, not only to their penetration in depth into the fruit, but often much more to the preventive action exercised on the surface against the olive fly.

6067. Orphanidis, P. S.
Étude sur l'efficacité des produits phytopharmaceutiques employés contre le dacus dans le cas de piqures simples et multiples par fruit. **(Study of the efficacy of chemicals used for olive fly control in the case of simple and multiple fruit punctures.)**
Ann. Inst. phytopath. Benaki, 1959, **2**: 149-58, bibl. 9.

Data here presented lead the author to suggest that it may be possible and expedient—in theory at any rate—to control the olive fly and perhaps such other pests as *Ceratitis*, not only by means of products which kill larvae and adults, but also by products which continue to kill them for a very long time. Those seeking new materials for control of the olive fly should look for products with a very long residual action.

6068. Boness, M.
Trial controls of olive fly—field tests in Corfu.
Höfchen-Briefe, 1960, **13**: 89-92.

Applications of Lebaycid emulsion, at 0·1% and 0·06% active agent, and of Lebaycid wettable powder, at 0·06%, gave a 100% kill of olive fly larvae colonizing the treated trees. The residual effect lasted for 5–6 weeks and 6–8 weeks at dosages of 0·06% and 0·1% active agent, respectively. Some other insecticides tested proved inferior to Lebaycid.

6069. Kolbe, W.
Trial controls of olive fruit fly by means of Lebaycid in Crete.
Höfchen-Briefe, 1960, **13**: 52-89, bibl. 45, illus.

In a comparison between Lebaycid and several other insecticides in Crete the former had the best initial and residual effect against larvae of the olive fly at concentrations of 0·03% and 0·015% active agent. At the same concentrations Lebaycid proved superior to the N-monomethylamide of O, O-dimethyldithiophosphoryl acetic acid for the control of adult flies.

6070. Tominić, A.
Ispitivanja preparata i načela suzbijanja maslinovog moljca. **(Testing of preparations and principles of olive moth control.)** [English summary ½ p.]
Zasht. Bilja, 1959, No. 51, pp. 83-9, bibl. 5.

Phosphoric acid ester preparations proved the most effective for the control of *Prays oleellus*, especially of the larvae at the hatching stage, egg development also being inhibited by the stronger dosages. Arsenic compounds had the least effect on the larvae.—Inst. Adriatic Cultures, Split.

6071. Graniti, A.
Sensibilità selettiva dell'olivo a trattamenti antiparassitari con volumi di acqua ridotti. **(Varietal susceptibility of olives to some concentrated sprays.)**
Inf. fitopat., 1960, **10**: 39-42, illus.

Rogor, applied at a 1·5% concentration, was found a fortnight after application to do serious damage to fruits of the variety Coratina. A note of caution is sounded on the indiscriminate use of concentrates without previous trial.

6072. Orphanidis, P. S., Phytizas, E. A., and Vasakas, D. T.
Résidues de rogor, dimécron, ekatin, ekatin M, dipterex, diazinon et parathion dans l'huile et dans l'olive. **(Residues of Rogor, dimecron, Ekatin, Ekatin M, Dipterex, diazinon and parathion in the oil and fruit of the olive.)**
Ann. Inst. phytopath. Benaki, 1959, **2**: 102-17, bibl. 12.

Current results: for previous year, see *H.A.*, 29: 4010.

6073. Orphanidis, P. S., and Vasakas, D. T.
Décomposition des résidus des insecticides phosphorés par la méthode courante de traitement des olives par des substances alcalines. **(The current method of decomposing the residues of phosphoric insecticides by alkalis.)**
Ann. Inst. phytopath. Benaki, 1959, **2**: 118-29, bibl. 17.

The use of NaOH and NaCl successful; for previous results see *H.A.*, 29: 4015 p.

6074. Morani, V., and Colloca, C. M.
Ricerche spettrofotometriche nell' u.v. sugli oli d'oliva. **(Ultra-violet spectrophotometric investigations on olive oils.)** [English summary ¼ p.]
Ann. Sper. agrar., 1960, **14**: 293-307, bibl. 13.

A promising method for distinguishing natural edible olive oils from those which have been rectified.

Passion fruit.

(*See also* 5939, 5940.)

6075. Katayama, Y., Saito, Y., and Shigeyama, T.
Culture of the passion fruit plant as a newly introduced crop in the southern region of Japan. [Japanese, with English summary $\frac{1}{3}$ p.]
Bull. Fac. Agric. Univ. Miyazaki, 1959, **5**: 18-28, bibl. 9, illus.

Observations on morphology, fruiting habit, propagation methods, chemical composition and juice processing are included.

6076. Pruthi, J. S.
Physico-chemical composition of passion fruit (*Passiflora edulis*, Sims.). II. Effect of stage of maturity of fruit at picking time.
Indian J. Hort., 1959, **16**: 110-12, bibl. 7.

The juice from fruit gathered at the yellowish-green stage was inferior in every way to that obtained from partly purple and fully purple fruits. There was no analytical difference between the last two, but the purple fruits had the better flavour. [See also *H.A.*, 30: 2795.]—Cent. Food tech. Res. Inst., Mysore.

Persimmons.

6077. Samarina, A. P.
Biological features of the fertilization of subtropical persimmons. [Russian.]
Agrobiologija, 1960, No. 1, pp. 144-6, illus.

Investigation of 26 varieties showed that they could be classified into 3 groups, i.e. those requiring cross-pollination, those not requiring cross-pollination and an intermediate group. In the last group crops were increased by cross-pollination, but, as in the second group, some seedless fruits were obtained. Seedless fruits had a uniform orange colour.

Pomegranates.

6078. Nath, N., and Randhawa, G. S.
Studies on floral biology in the pomegranate (*Punica granatum* L.). I. Flowering habit, flowering season, bud development and sex-ratio in flowers. II. Anthesis, dehiscence, pollen studies and receptivity of stigma. III. Pollination, fruit-set and seed formation.
Indian J. Hort., 1959, **16**: 61-8, bibl. 10, illus., 121-35, bibl. 10, illus., and 136-40, bibl. 7.

Of the 7 varieties examined 4 flowered only once a year, 2 twice and an ornamental variety three times. Bud development periods varied from 14 to 27 days, with a positive correlation between the length of bud development and fruit setting. The percentage of hermaphrodite flowers ranged from 25 to 53·85 in the fruit varieties, none being found in the ornamental. This percentage was greatest during the early part of the flowering season, decreasing later. Anthesis and dehiscence were influenced by the maximum temperature. Pollen grains varied in size but were highly fertile in all varieties, though there were seasonal changes in both size and fertility. Media consisting of 12·5% sugar or 12·5% sugar + 0·5% agar proved the most suitable for artificial pollen germination. Both self- and cross-pollination occurred but fruit set was higher with the latter. Fruit set ranged from 4·7% to 26·9%, and seed production from 25·5% to 42·9%.—Indian agric. Res. Inst., New Delhi.

Tung.

6079. Anon.
How to cut tung fertilizer bills.
Agric. Res. Wash., 1960, **8**(8): 13, illus.

Trials showed that, in low-crop years, the application of too much N and K actually reduced crops. The best levels appeared to be N at 125 lb., P_2O_5 at 60 lb. and K_2O at 150 lb. per acre. When there was no crop, N was unnecessary in the following year.

6080. Spoon, W.
Houtolie uit de tropen. (**Tung oil from the tropics.**) [English summary $\frac{1}{2}$ p.]
Verfkroniek, 1959, **32**: 392-4, bibl. 7, illus., reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **271**, 1959, pp. 7.

The properties of the oil from *Aleurites montana* imported from Java are compared with British and Dutch standards. The differences between varnishes and lacquers prepared from this oil and those prepared from *A. fordii* oil from China were negligible.

TROPICAL FRUIT AND PLANTATION CROPS

General.

(*See also* 4696, 4750.)

6081. I.N.É.A.C.
Au service de l'agriculture congolaise. L'Institut National pour l'Étude Agronomique du Congo Belge. Son but. Son programme. Ses réalisations. **(In the service of Congo agriculture. I.N.É.A.C., its aims, programme and achievements.)**
[*Publ.*] *I.N.É.A.C.*, 1959, 5th ed., pp. 168, illus., free of charge.

A brief account of the general organization of I.N.É.A.C. is followed by notes on the work carried out at the Research Centre at Yangambi and at stations in different parts of the Congo. Crops investigated include oil palms, rubber, robusta coffee and cacao. There are vegetation, soil and climate maps.

6082. Marynen, T.
Précis de phytotechnie des principales cultures industrielles d'après les travaux des spécialists de l'I.N.É.A.C. **(A summary of cultivation techniques for the principal commercial crops based on the work of I.N.É.A.C. specialists.)**
Publ. hors Sér. I.N.É.A.C., 1960, pp. 112, bibls, illus., 100 Fr. (Belg.).

This is in effect a planters' manual, in which the various practical recommendations are based on published scientific papers. The crops dealt with include oil palms, rubber, robusta and arabica coffee, cacao, tea, tobacco and fruit trees, mainly citrus. All aspects of crop production are briefly covered.

6083. Angladette, A.
Notes sur l'économie agricole du Ruanda Urundi. **(Notes on the agricultural economy of Ruanda Urundi.)**
Agron. trop., 1959, **14**: 572-99, bibl. 33, illus.

The crops discussed include coffee, tea, oil palms, castor beans, pyrethrum and tobacco.

6084. Hunter, J. R.
The climatic limits of cacao, coffee and rubber.
Coffee Cacao Train. Mat., 1959, No. 16, pp. 9, bibl. 15.

Information is given on the temperature and rainfall requirements of these 3 crops, and from this the optimum ecological locality for each is deduced. For example, that for arabica coffee is considered to be the moist forest of the sub-tropical belt according to the Hildridge system of classification of plant formations. For *C. canephora*, hevea and cacao the moist forest of the tropical belt is considered best.

Areca palms.

6085. Bavappa, K. V. A.
Field experimentation in arecanut—Part I.
Arecanut J., 1959, **10**: 116-22, bibl. 7, illus.

The various factors to be considered in organizing field trials with areca palms are discussed. A plot of 24 seedlings was found to be the most suitable for nursery experiments.

6086. Murthy, K. N., and Bavappa, K. V. A.
Abnormalities in arecanut.
Arecanut J., 1959, **10**: 97-107, illus.

Instances of aerial roots, branching stems, stem splitting, suckering, fused leaflets, chimaeras, polyembryony, polycarpy and vivipary.

6087. Menon, R.
***Ceriospora arecae* Menon *sp. novo*. Seedling blight in arecanut nurseries. Soft rots on the arecanuts.**
Arecanut J., 1959, **10**: 108-15, bibl. 6, illus.

The first paper describes the pathogen of yellow leaf disease. The second paper describes a seedling blight apparently caused by fungal infection, which may be minimized by top dressings of ammonium sulphate and spraying with Kriticopper. In the third paper spraying with 1% bordeaux is recommended for the control of *Dimerosporina arecae*, and with 2% bordeaux for *Erwinia* rot and bitter rot (*Glomerella cingulata.*)

Bananas and abaca.

(*See also* 4738, 6301, 6309, 6311-6314.)

6088. Smirin, S.
Banana growing in Israel.
Trop. Agriculture Trin., 1960, **37**: 87-95, bibl. 5.

Climate, soils and management.

6089. Simmonds, N. W.
The growth of post-war West Indian banana trades.
Trop. Agriculture Trin., 1960, **37**: 79-85, bibl. 3.

Rates of increase in production were less than expected and declined after about 4 years.

6090. Jain, R. K.
***Ensete berryi:* revised name for *Musa enseteformis* Berry.**
Nature, 1960, **187**: 342-3, bibl. 2.

A fossil banana renamed.

6091. Murray, D. B.
The effect of deficiences of the major nutrients on growth and leaf analysis of the banana.
Trop. Agriculture Trin., 1960, **37**: 97-106, bibl. 2.

In greenhouse experiments the reduction in growth rate, as measured by the rate of leaf production, was determined for deficiencies of N, P, K, Ca and Mg. Supplies of nutrients in the corm permitted growth for some considerable time except in the case of lack of N. The leaf levels of these elements as they were affected by deficiency, were determined. Visual deficiency symptoms occurred at levels considerably lower than those at which growth was reduced. [See also *H.A.*, 29: 4018.]—I.C.T.A., Trinidad.

6092. BERRILL, F. W.
Desucker your bananas one of these ways.
Qd agric. J., 1960, **86**: 55-7, illus.

Surplus suckers may be removed from the stool by kerosene treatment or by gouging. With kerosene the sucker is cut off close to ground level and a small quantity of kerosene is poured into a cavity made in the basal portion. When a desuckering gouge is used, the growing point of the sucker is removed, but regrowth is often greater with this method than with kerosene, and the exposed corm tissue is also subject to borer attack.

6093. BLAKE, C. D.
Corm rot disease of bananas.
Banana Bull., 1959, **22**(12): 7.

The disease is caused by a number of fungi, especially *Armillaria mellea* and *Clitocybe* sp. Infected stools should be dug out and burned, and the holes exposed to the sun and air. Replanting should be carried out some feet away from the position of the infected stools. When a plantation is established on forest land, all roots should first be removed from near the planting sites.

6094. PEREIRA, H. F., DE FIGUEIREDO, E. R., JR., AND HUSSNI, J.
A cercosporiose da bananeira. Sua ocorrência no Estado de São Paulo. Experiências e combate. (**Cercospora leaf spot of banana. Its occurrence in the State of São Paulo. Trials and control.**) [English summary ½ p.]
Arq. Inst. biol. S. Paulo, 1958, **25**: 161-84, bibl. 9, illus.

Musa textilis is rated immune, the branca and pacovão varieties of *M. sapientum* resistant and the baé variety of *M. cavendishii* and all other varieties of *M. sapientum* susceptible. In 2 control trials the best results were given by 1% bordeaux mixture, which should be applied every 3 weeks in winter and once a month in spring.

6095. BRUN, J.
Étude de l'action des fongicides huileux dans la lutte contre le cercosporiose. Action des traitements huileux sur la germination et la pénétration des ascospores de *Mycosphaerella musicola* Leach. (**A study of the effect of oil fungicides on cercospora leaf spot. The effect of oil treatments on the germination and penetration of ascospores.**)
Fruits d'Outre Mer, 1959, **14**: 419-22, bibl. 2, illus.

In a field trial, in which banana leaf inoculation was carried out immediately, 24 hours, 48 hours or one week after the application of an oil fungicide, 45, 65, 99 and 99% respectively of the ascospores failed to germinate. It was concluded that the oil did not have its full effect until after 48 hours and that its residual effect lasted at least a week. [For earlier work, see *H.A.*, 28: 3030].—I.F.A.C., Foulaya.

6096. BLAKE, C. D., AND CHALKER, C. F.
Cercospora leaf spot and speckle of bananas.
Agric. Gaz. N.S.W., 1960, **71**: 121-5, 164, illus.

Recommendations are given for high volume protective spraying with bordeaux mixture or low volume misting with mineral oil at 1½–2 gal. per acre at 3-week intervals [see also *H.A.*, 30: 2816]. The addition of copper to the oil will also give some, but not complete, control of speckle, thought to be caused by *Sphaerella musae*.

6097. CALPOUZOS, L., AND OTHERS.
A micro-spray technique for evaluating low-volume oil-based sprays for disease control on single banana leaves in the field.
From abstr. in *Phytopathology*, 1959, **49**: 535.

The method employs an artist's airbrush connected by a hose to a regulator valve on a tank of compressed air. The same amount of oil is applied to the leaf surfaces as is deposited at commercial rates with ordinary spray equipment.

6098. RISHBETH, J.
Factors affecting the incidence of banana wilt ("Panama disease").
Emp. J. exp. Agric., 1960, **28**: 109-13, bibl. 8.

In a glasshouse experiment with the variety Gros Michel characteristic wilt symptoms appeared 6 weeks after inoculation with *Fusarium oxysporum* f. *cubense* in rapidly growing plants, for which soil moisture remained at a steady, moderately high level, but not in plants subject to fluctuating soil moisture. Response to K fertilizer, as shown by leaf analysis, was appreciable with good soil aeration but undetectable with poor aeration. Severity of disease symptoms appeared to be inversely related to K uptake. The possibility of improving K uptake by mature bananas sufficiently to induce wilt-resistance is discussed: a preliminary attempt to achieve this by peroxide applications has failed. Observations are made on a further small outbreak of wilt in Lacatan bananas, reported from Jamaica. [Author's abstract.]—Univ. Cambridge.

6099. NEWCOMBE, M.
Some effects of water and anaerobic conditions on *Fusarium oxysporum* f. *cubense* in soil.
Trans. Brit. mycol. Soc., 1960, **43**: 51-9, bibl. 5.

Carbon dioxide and flooding both inhibited chlamydospore production and so caused attenuation. Sterilized pieces of banana leaf were used as baits to study fungal activity.

6100. MEREDITH, D. S.
Some observations on *Trachysphaera fructigena* Tabor & Bunting, with particular reference to Jamaican bananas.
Trans. Brit. mycol. Soc., 1960, **43**: 100-4, bibl. 5, illus.

The fungus was recorded in Lacatan bananas stored in the United Kingdom. The infection probably originated from West African fruit previously stored in the ripening rooms. Attempts to infect healthy unwounded fruit were unsuccessful.

6101. LOOS, C. A., AND LOOS, S. B.
Preparing nematode-free banana "seed".
Phytopathology, 1960, **50**: 383-6, bibl. 6, illus.

Four banana varieties cultivated for export are susceptible to various nematodes which are distributed to new plantations on infected "seed" (rhizomes). Paring all discoloured tissues from the rhizomes eliminated the nematodes. Pared "seed" was surface-decontaminated in a bordeaux-Nemagon dip and air-dried for 24 hours. Paring Gros Michel rhizomes delayed harvest of the first fruits for 2 weeks. Over a 50-week period, however, there was no significant difference between pared and regular plantings in number of harvested stems or fruit size. The beneficial effect of paring was manifested in the first ratoon crop. Up to 17 months after planting there was a 44% increase in number of harvestings and a substantial increase in fruit weight. [From authors' summary.]— Banana Board of Jamaica, Kingston.

6102. PRICE, D.
The control of parasitic eelworms in bananas.
Trop. Agriculture Trin., 1960, **37**: 107-9, bibl. 3.

Nemagon 75 EC, watered in at the rate of 3 gal. of chemical per acre, gave increases of 28% in mean plant circumference 9 months after planting. It was calculated that, to be profitable, the crop must be increased by about 10%, and it is expected that this will often be exceeded.—Cameroons Develop. Corp.

6103. PEREIRA, H. F., DE FIGUEIREDO, E. R., JR., AND HUSSNI, J.
Nematóide cavernícola nos bananais do litoral de São Paulo. **(The burrowing nematode in coastal banana plantations of São Paulo.)**
Biológico, 1960, **26**: 27-31, bibl. 3, illus.

In general, chemical control of the nematode *Radopholus similis* in banana plantations is uneconomic. Preventive measures include the immersion of the trimmed bases of transplants in water at 55° C. for 5 minutes. Infested plantations should be completely cleared and then flooded for 6 months before replanting.

6104. BRAITHWAITE, B. M.
Banana fruit-eating caterpillar.
Banana Bull., 1959, **22**(12): 7.

Dusting the bunches with 2% DDT is probably the most practicable means of control.

6105. BRAITHWAITE, B. M.
Red spider in bananas.
Banana Bull., 1960, **23**(1): 6.

Recommended control, using a high volume knapsack or power sprayer, is 1 pint Kelthane or ½ lb. Trithion per 50 gal. Approximately 150 gal. of spray are required per acre, very thorough application to the under-surface of the leaves being necessary. Using a misting unit the recommended rates are 1½ pints Kelthane or 1½ lb. Trithion to 8 gal. per acre.

6106. MAGEE, C. J.
Hermetical handling of bananas.
Commonw. phytopath. News, 1960, **6**: 28-9.

In New South Wales fruit cut at the ¾ full stage, treated with mycostatin and salicylanilide and sealed in polythene remained green and firm after 14 days at 27° C. and ripened satisfactorily thereafter at 20° C. Trials at lower temperatures for longer periods have also been successful.

6107. DEDOLPH, R. R., AND GOTO, S.
Ripening of Hawaiian-grown bananas with growth regulators.
Hawaii Fm Sci., 1960, **8**(3): 3-4, illus.

Hands of Dwarf Cavendish bananas were cut and dipped in water solutions of (1) 2,4-D at 100 p.p.m., (2) GA at 20 p.p.m., (3) 2,3,5-triiodobenzoic acid at 25 p.p.m., (4) IAA at 250 p.p.m. or (5) water only. A wetting agent was present in each case. The treated bananas were stored at 55–79° F. and inspected 4, 7 and 11 days after treatment. The bananas treated with 2,4-D ripened more quickly and uniformly than those from the other treatments. In a second experiment each bunch of bananas was divided into 4 and sections dipped for 5 sec. in (1) 2,4-D 200 p.p.m., (2) NAA 500 p.p.m., (3) IAA 200 p.p.m. or (4) water, followed by storage at 67–82° F. On inspection it was noted that, in general, the distal hands ripened later, following the natural ripening pattern of the plant, but that after 6 days fruits treated with 2,4-D and NAA were uniformly ripe over all the bunch, as the chemicals had accelerated the ripening of the distal hands more than that of the proximal hands. Finger drop occurred thrice as often in the control and IAA treatments as in the NAA and 2, 4-D treatments.

6108. ELA, V. M., OCFEMIA, G. O., AND DAVIDE, R. G.
Effects of gibberellin on young abacá plants infected with the mosaic disease.
Philipp. Agric., 1959, **43**: 480-2, illus,

In concentrations of 25–200 p.p.m. GA produced the usual internode elongation but had no ameliorating action on the mosaic infection.

Cacao.

(*See also* 5301, 6081, 6082, 6084, 6299-6301, 6306, 6309, 6313.)

6109. Ostendorf, F. W.
Problemen van de cacaocultuur in Amerika. **(Problems in cacao culture in America.)**
Landbouwk. Tijdschr., 1960, **72**: 296-311, bibl. 30, maps.

A survey of types of cacao grown, cultural systems, diseases and pests, research work and the future of the industry in Central and South America and the West Indies.

6110. Liabeuf, J.
La production du cacao en Colombie. **(Cacao production in Colombia.)**
Café, Cacao, Thé, 1959, **3**: 67-75, illus.

The subjects discussed include climate; location of the cacao growing areas; types, viz. Caucano (criollo), Pajarito (forastero-trinitario) and Amazonian forastero; establishment and maintenance of plantations; shading with *Erythrina* spp.; diseases (*Monilia* pod rot, *Phytophthora* stem canker and a *Xyleborus-Ceratostomella* complex); and processing.

6111. West African Cocoa Research Institute.
Annual Report of the West African Cocoa Research Institute, 1958-59, 1960, pp. 87, illus., 5s.

Plant pathology: Work continued at both Tafo and Ibadan on cacao viruses. Susceptibility to the mottle leaf virus was found in 2 species of *Corchorus* and to swollen shoot virus in an exotic from Trinidad, *Muntingia calabura.* The soil proved to be a source of infection of *Phytophthora palmivora*, and this fungus appeared capable of limited saprophytic development therein. A survey indicated that cushion-gall disease was unlikely to be of economic importance in Ghana. *Entomology:* When trees that had been treated in the previous year were given 2 more applications of dieldrin at 1 lb. in 20 gal. per acre, the mealy bug (*Pseudococcus njalensis*) population fell to zero in the 2nd month after treatment. Endrin proved outstanding for the control of capsids. *Agronomy*: In the amelonado spacing trials 7½ ft. × 7½ ft. continued to give the highest yield per acre. A pilot irrigation experiment, in which the inadequate rainfall between the middle of December and the middle of March was supplemented by watering, showed significantly increased growth on plots in which the soil moisture was held above 18% compared with plots in which it fell to 13% and plots left unirrigated. *Chemistry:* Suitable ratios for the major plant nutrients required for optimum growth of seedlings in culture were determined.

6112. Murray, D. B., and Cope, F. W.
A stock-scion experiment with cacao. III.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 29-35, bibl. 5.

All 16 combinations of 4 clones as scions and stocks were tested. Poor clones gave higher yields on good stocks and *vice versa*, but no combinations gave higher yields than the best clone on its own roots. Interaction between scion and stock was negligible. [For part II, see *H.A.*, 26: 1103.]

6113. Maliphant, G. K.
The cacao tree size-yield correlation.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, p. 80, bibl. 3.

The significant correlation between the girth of 3½-year-old trees and subsequent yields disappeared after 7 years in shaded trees and after 8 years in trees grown without shade, except in close spaced (8 × 8 ft.) plots, in which the relationship was seen only in the 1st crop. [See also *H.A.*, 29: 863.] With close spacing competition for nutrients and moisture from weeds was rapidly eliminated by the shading effect of the canopy.

6114. Maliphant, G. K.
Manurial and cultural experiments on cacao. Part VI. River Estate, Trinidad. Part VII. River Estate, Trinidad. Shade, spacing, times and rates of fertilizer application experiment.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 81-82, and 83-6, bibl 2.

In part VI details are given of 3 new experiments started and of 5 old ones abandoned. In part VII results are reported, which show that the response to N fertilizer was greater with unshaded trees and greatest with 900 lb. ammonium sulphate per acre plus 300 lb. double superphosphate, applied half in May and half in September. Although the effects of P were usually greater in the absence of shade, the highest yields were obtained from a split dressing of 300 lb. double superphosphate under shade. The influence of K was also greatest under shade with a split dressing of 600 lb. potassium chloride per acre. The responses to P and K increased with successive crops.

6115. Maliphant, G. K.
The nutrition of cacao. Part II. Leaf nitrogen and phosphorus contents.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 76-9, bibl. 4.

Under shade conditions there was no correlation between leaf N content and yield, but without shade and with wide spacing it was positive and highly significant. The correlation between leaf P content and yield was negative in the unshaded plots and positive under shade. [For part I, see *H.A.*, 28: 959w.]

6116. Schroo, H.

A presentation of leaf analytical data on cacao, obtained from a fertilizer trial in Netherlands New Guinea.

Neth. J. agric. Sci., 1960, **8**: 93-7.

An attempt is made to compare the results of soil analysis with those obtained from leaf analysis as a guide to the nutritional demands of young cacao. The closest agreement was found for P and Mg. Agreement for N, K and Ca was less satisfactory. It is recommended that leaf analysis should not be used as an alternative to soil analysis but as a complementary method.—Agric. Res. Stat., Manokwari.

6117. Nichols, R.

The effect of gibberellic acid on cacao seedlings.

Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 41-3, bibl. 3, illus.

The increase in growth induced in seedlings by GA was mainly due to elongation of the internodes, resulting in a very weak stem. No response to GA at 50 p.p.m. was observed in well rooted cuttings.

6118. Nichols, R.

The growth substances of *Theobroma cacao*. II.

Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 44-7, bibl. 5.

A correlation was established between cacao auxins I and II and the wilting of cherelles, and evidence was obtained that auxin I was probably not IAA. Practically no residual auxins were found in the dormant buds of fan branches between flushes. [For part I, see *H.A.*, 28: 849.]

6119. Cope, F. W.

Incompatibility in *Theobroma cacao*.

Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 7-17, bibl. 7, illus.

A fuller account of work reported in *H.A.*, 28: 1855.

6120. Glendinning, D. R.

Selfing of self-incompatible cocoa.

Nature, 1960, **187**: 170, bibl. 4.

This was achieved in an Upper Amazon variety by pollinating with pollen from a compatible tree together with a little pollen from the clone itself. The compatible pollen contained a marker-gene detectable in the seedlings. Four out of 50 seedlings did not show the marker-gene character and are thought to be selfed progeny.—W.A.C.R.I., Tafo, Ghana.

6121. Malaguti, G.

La buba o "agallas" del cacao. **(Cushion gall of cacao.)**

Agric. venezol., 1959, **23**(215): 8-9, bibl. 7, illus.

In Venezuela this disease is commoner in trees 10–12 years old than in trees 50–60 years old, and is surprisingly prevalent in plantations only 2–3 years old derived from cuttings. Certain very early maturing strains (e.g. Ocumare 24) are affected at 8–10 months, and some hybrids as early as 3 months, long before the floral cushions form. The symptoms resemble in some respects those of witch's broom, in others those of phylloidy and green flower. It is possible that, particularly in the hybrids, a genetical disturbance is involved.

6122. Brunt, A. A., and Wharton, A. L.

Transmission of a gall disease of cacao.

Nature, 1960, **187**: 80–1, bibl. 9, illus.

A gall disease of cacao in Ghana has been transmitted from galls on mature trees and artificially infected seedlings by the mealy-bug species *Pseudococcus njalensis* and *Ferrisiana virgata* and also by various mechanical methods. It is suggested that the disease is of bacterial or fungal origin, and because of its similarity to cushion gall disease of the Western Hemisphere the destruction of all galls is recommended. [See also *H.A.*, 30: 4409.] —W.A.C.R.I., Tafo, Ghana.

6123. Thresh, J. M., and Lister, R. M.

Coppicing experiments on the spread and control of cacao swollen-shoot disease in Nigeria.

Ann. appl. Biol., 1960, **48**: 65-74, bibl. 27.

A coppicing technique was used to determine the incidence and distribution of latent and unrecognized infection around naturally occurring outbreaks of the disease. All the apparently healthy trees within 30 yards of 80 outbreaks of various sizes were coppiced, and most of the infected stumps which regenerated showed symptoms within a year. The distribution of the infected stumps around 35 outbreaks studied in detail is expressed by the equation $\log_{10} I = a + bx$. I is the estimated intensity of infection in the coppiced stumps at distance x from the nearest infected tree removed at the time of coppicing. The constant a determines the height of the peak of the infection gradient and increases with outbreak size, whereas the slope of the gradient, determined by the negative constant b, is similar around all outbreaks. The results are consistent with information on the movement of the mealybugs and spread of cacao swollen-shoot virus in outbreaks. Moreover, they indicate that outbreaks are controlled most economically by removing all obviously infected trees and adjacent apparently healthy ones. Control does not require the destruction of all the trees around outbreaks up to a distance of 30 yards, as done previously, but can be achieved by felling fewer trees, the actual number depending on the size of the outbreak. [Author's summary. See also *H.A.*, 29: 2941.]

6124. MURRAY, D. B., AND SWARBRICK, J. T.
Heat treatment of cacao budwood with reference to cacao virus.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 65-6, bibl. 2.

No inactivation of Trinidad virus strain B was obtained by hot water treatments up to the limits of heat tolerance of the budwood. Cold water treatment, up to 40 minutes at 3° C., appeared to accelerate bud break of patch buds.

6125. ITON, E. F.
Studies of a wilt disease of cacao at River Estate.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 55-64, bibl. 10, illus.

Ceratostomella (*Ceratocystis*) *fimbriata* appeared to be transmitted both by wind and by insects, and some varietal difference in susceptibility was observed. Control is being attempted by uprooting and burning dead trees and spraying the remainder with BHC to control *Xyleborus* borers.

6126. BARTLEY, B. G. D.
The efficiency of a test of the resistance of cacao seedlings to *Marasmius perniciosus* Stahel.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 49-52, bibl. 3.

The response of seedlings to infection was affected by environmental conditions, and uniform conditions of growth are considered to be essential for accurate classification of phenotypes.

6127. DUDMAN, W. F., AND NICHOLS, R.
Examination of culture filtrates of *Marasmius perniciosus* Stahel for gibberellin-like substances.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, p. 48, bibl. 2.

Results were negative [see *H.A.*, 29: 2942.]

6128. THROWER, L. B.
Observations on the diseases of cacao pods in Papua-New Guinea. I. Fungi associated with mature pods. II. Cherelle wilt.
Trop. Agriculture Trin., 1960, 37: 111-20, bibl. 11, and 121-4, bibl. 6.

Black-pod disease was caused by *Phytophthora palmivora* in wet weather, but this fungus was absent from rotting pods in dry weather, when the weakly pathogenic fungi *Botryodiplodia theobromae* and *Colletotrichum* sp. were present. The recommended control measure of removing diseased pods and leaving them on the ground was found to be satisfactory, as, when this was done, the sporangia on the surface of the pod rapidly disappeared. Cherelle wilt was shown to consist of a pathological component and a physiological component. *Phytophthora palmivora* was directly responsible for the pathological wilt, which accounted for approximately 25% of the total. The physiological wilt is thought to be due to internal competition between the various plant organs for water.—Dep. Agric., Papua-New Guinea.

6129. FERNANDO, H. E.
Studies of *Empoasca devastans* Dist. (Fam. Jassidae, Ord. Hemiptera), a new pest of cacao causing defoliation, and its control.
Trop. Agriculturist, 1959, **115**: 121-44, bibl. 12, illus.

This leaf hopper was first observed attacking cacao in association with *Scirtothrips dorsalis* in 1956, and among its effects are an increase in the sugar content and a decrease in the N content of the damaged foliage. Complete control and prevention of re-infestation 1 week later was obtained by high volume spraying with a 0·6% solution of 25% DDT e.c., by low volume spraying of the same formulation in 3% solution and by dusting with 5% DDT at 10 lb. per acre.

6130. FENNAH, R. G.
Nutritional factors associated with the development of mealybugs on cacao.
Rep. Cacao Res. I.C.T.A. 1957-1958, 1959, pp. 18-28, bibl. 18, illus.

The degree of mealybug infestation, mostly *Planococcus citri*, was found to be positively correlated with the application of N, but negatively correlated with K application and light intensity. There was no correlation with P.

6131. MURRAY, D. B., AND GRIFFITHS, L. A.
Effects of delayed filling of cacao fermentation boxes.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 67-9.

Deterioration in the appearance, quality and flavour of the beans occurred when the filling of the boxes was prolonged beyond one day.

6132. GRIFFITHS, L. A.
On the optimal conditions for micro-fermentation: a critical review.
Rep. Cacao Res., I.C.T.A., 1957-1958, 1959, pp. 70-2, bibl. 9.

6133. GRIFFITHS, L. A.
A laboratory procedure for micro-fermentation and small-scale drying.
Rep. Cacao Res. I.C.T.A., 1957-1958, 1959, pp. 74-5, bibl. 2, illus.

With an inoculum from an estate sweat box used in glass cylinders in an incubator, followed by drying with an electric fan and infra-red lamp.

Cashews.

(*See also* 6312.)

6134. ABRAHAM, P.
Air layering is a success with cashew.
Indian Fmg, 1956, 5(10): 26-7, illus., [received 1960].

Detailed instructions.

6135. ALBUQUERQUE, S. D. S., HASSAN, M. V., AND SHETTY, K. R.
A note on the packing of cashew layers for transport.
Mysore agric. J., 1959, **34**: 156-8, bibl. 2.

Potted in grass pots 4–6 in. wide, hardened in the nursery and packed in bamboo baskets, cashew layers withstood 20 days' transit without watering and showed 83–88% survival on planting.—Cent. Cashewnut Res. Stat., Mangalore.

6136. ALBUQUERQUE, S. D. S., HASSAN, M. V., AND SHETTY, K. R.
Studies on the apple characters of cashew (*Anacardium occidentale* L.)
Mysore agric. J., 1960, **35**: 2-8, bibl. 3.

Correlations were found between the size of the apples [swollen peduncles], the size of the nuts and the juice content. Yellow apples tended to be heavier, softer and less astringent than red apples. —Cent. Cashewnut Res. Stat., Mangalore.

6137. BIGGER, M.
***Selenothrips rubrocinctus* (Giard) and the floral biology of cashew in Tanganyika.**
E. Afr. agric. J., 1960, **25**: 229-34, bibl. 2.

On 3-year-old trees attacked by this insect more flowers were produced but yields were reduced from 637 lb. to 378 lb./acre. Thrips attack reduced the set of perfect flowers from 10·2% to 2·8% owing to drastic reduction in the number of male flowers.—Dep. Agric., Nachingwea, T. T.

Coconuts.

(*See also* 6299, 6301, 6133, 6314.)

6138. PANDALAI, K. M.
Recent advances in coconut research in India.
Nature, 1960, **186**: 860-2.

A résumé of the Conference organized by the Indian Central Coconut Committee, Ernakulam, in December, 1959.

6139. MARAR, M. M. K.
Setting up elite coconut seed farms.
Coconut Bull., 1960, **14**: 3-6, illus.

Stresses the importance of isolation and proper hybridization technique.

6140. PRÉVOT, P., AND OLLAGNIER, M.
Directions for use of foliar diagnosis.
Fertilité, 1957, No. 2, pp. 3-12.

In coconut and oil palms. [See also *H.A.*, 30: 4380.]

6141. FELIZARDO, B. C., AND GALVEZ, N. L.
Some effects of fertilizers on yellowing coconut.
Philipp. Agric., 1960, **43**: 512-20, bibl. 10.

The application of N, NP and NPK to the tilled areas around the palms corrected the yellowing and improved yield. Of the increase of 84 nuts per plot obtained in the 2nd year with NPK, 43 were attributed to the N, 23 to the P and 18 to the K. Ammonium sulphate tended to increase the N and S contents of the leaves and reduce the pH of the surface soil.

6142. VELASCO, J. R., AND OTHERS.
Chemical composition and physical properties of soil samples from coconut groves.
Philipp. Agric., 1959, **43**: 433-45, bibl. 10.

Further indications were obtained that cadang-cadang in the Philippines may be caused by copper deficiency and aluminium toxicity [see also *H.A.*, 30: 1253]. Virus infection, however, is not yet ruled out.

6143. SRIKANTAIYA, M.
Anabe roga of coconut in Mysore.
Coconut Bull., 1960, **13**: 389-92, illus.

The spread of the fungus *Ganoderma lucidum*, which causes root and butt rot, can be checked by burning all dead stumps and isolating affected trees with a trench of 3 ft. radius, 2 ft. in depth and 1 ft. wide. Soil disinfection with 2 lb. sulphur dust per trench is recommended.

6144. MARAR, M. M. K., AND PADMANABHAN, V.
Preliminary studies on the storage of copra in plastic-lined gunny bags.
Coconut Bull., 1960, **14**: 7-10, illus.

Copra, sun-dried in the summer, was kept for 6 months in gunny sacks, with and without Alkathene [polythene] linings. The plastic-protected samples showed slight superficial mould growth but had not declined in quality, whereas the controls had deteriorated badly from mould and insect attack.

6145. ABRAHAM, A., AND SUBRAMONEY, N.
Nitrogen fixing organisms in coconut retting grounds in Kerala.
Curr. Sci., 1960, **29**: 100, bibl. 2.

Bacteria resembling azotobacter.

Coffee—general.

(*See also* 6081-6084, 6301, 6313, 6314, 6328.)

6146. U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
Record world coffee crop to increase surpluses. 1959-60 coffee crop substantially above 1958-59.
Foreign Agric. Circs U.S. Dep. Agric. **FCOF 4-59,** 1959, pp. 15, and **FCOF 1-60,** 1960, pp. 12.

The 3rd and 4th estimates: the crop is now put at 76·2 m. bags, compared with 61·2 m. last season.

6147. SUÁREZ DE CASTRO, F.
Coffee production in Colombia.
Fertilité, 1958, No. 5, pp. 61-6, bibl. 14, illus.

Over 400,000 tons per annum are produced in Colombia, mainly between 3,000 and 6,000 ft. in altitude; the chief type is typica.

6148. Robinson, J. B. D.
Notes on the diagrams illustrating coffee yields in Kenya (excluding African area production).
Kenya Coffee, 1960, **25**: 51-5.
Yields, 1948 to 1959, by districts.

6149. Indian Coffee Board.
Seventeenth Annual Report, 1956-57, Vol. IV. Coffee Statistics relating to India, [1959], pp. 413, Rs. 2.75.
Eighteenth Annual Report, 1957-58, Vols. I and II, 1959, pp. 83 and 67, each R.1.
The volume of Indian coffee statistics completes the 1956-57 reports. Of the 1957-58 reports that of the Research Department (Vol. III) was abstracted in *H.A.*, 30: 4433. Vol. I, now received, deals with general administration, propaganda and development, and Vol. II is concerned with marketing. Vol. IV, Statistics, had not yet been received.

6150. Coste, R.
General survey of the research programme of the French Coffee and Cocoa Institute.
Fertilité, 1958, No. 5, pp. 3-14, illus.

Coffee—varieties, propagation and culture

(*See also* 5304, 5305, 6164, 6306, 6332.)

6151. Vishveshwara, S.
Occurrence of a haploid in *Coffea arabica* L. cultivar "Kents".
Indian Coffee, 1960, **24**: 123-4, bibl. 8, illus.
Description of a plant observed at Balehonnur Coffee Research Station.

6152. Castillo Z., J.
Observaciones sobre tamaño de grano y granos anormales en variedades comerciales de café. **(Observations on seed size and abnormal seeds in commercial varieties of coffee.)**
Cenicafé, 1959, **10**: 397-418, bibl. 14.
The results of grading into 5 seed sizes are statistically analysed for the varieties Mundonovo B, Red Caturra, Mundonovo T, Yellow Caturra, Yellow Typica, and Yellow Bourbon, this being the descending order of percentages of extra large seed. In an experiment with Typica and Bourbon shading reduced the percentage of very large seeds on manured plots, but increased it on those without manure. Other factors concerned with variation in seed size are examined, including the season of harvesting and differences in progenies. The questions of effective sampling is discussed. For each of the 6 varieties the percentages of 4 types of abnormal seeds were investigated, namely (1) lacking endosperm, (2) round, through failure of the twin seed to develop, (3) 3-sided from a tri-locular instead of bi-locular ovary, and (4) with double endosperm.

6153. Pagacz, E. A.
Contribution à l'étude du mode de semis en caféiculture. **(A contribution to the study of methods of sowing coffee.)**
Bull. Inf. I.N.É.A.C., 1960, **9**: 1-6, illus.
Seeds with the parchment removed produced 50% of seedlings with cotyledons fully opened after 7 weeks compared with 40% after 10 weeks from seeds left in parchment. Transplanting in the nursery may be done when the cotyledons are completely opened or before they open. Seedlings at the former stage should be inserted rather deeply into the planting holes and then raised to the correct level so that the lateral roots are left pointing downwards. At the younger stage the seedlings have no side roots. Sowing position of the seeds has no effect on germination percentage.

6154. Forestier, J.
Fertilité des sols des caféières en République Centrafricaine. III. Étude des sols des caféières de la Lobaye. **(The fertility of coffee soils in the Central African Republic. III. A study of the coffee soils in the Lobaye area.)** [English and Spanish summaries ½ p. each.]
Agron. trop., 1960, **15**: 9-37.
For parts I and II, see *H.A.*, 30: 2883.

6155. Setzer, J.
Adubação do café. **(The manuring of coffee.)**
Bol. Super. Serv. Café S. Paulo, 1959, **34**(392): 5-12.
Recommendations for growers in São Paulo.

6156. Malavolta, —., Pimentel Gomes, —., and Coury, T.
Study of the coffee plant's mineral nutrition. (*Coffea arabica* L.—Red Bourbon variety.)
Fertilité, 1958, No. 5, pp. 15-25.
A factorial NPK experiment is described. Single fertilizers had little effect, but N and K in combination greatly increased yields. Foliar diagnosis indicated that yields were lower than the control when leaf N fell below 2·79% accompanied by leaf K below 1·62%. Lack of response to P may have been due to a sufficiency of P in the soil, as revealed by leaf analysis. Numbers of dry branches were counted and these were fewer where N and K had been applied. [See also *H.A.*, 29: 888.]—Agric. High School "Luiz de Queiroz", São Paulo, Brazil.

6157. Tuazon, A. B., and Mendoza, S. P.
Additional applications of ammonium sulfate fertilizer and the yield of arabica coffee.
Coffee Cacao J., 1960, **2**: 246-7, 250, bibl. 4, from *Trop. Abstr.*, 1960, **15**, Abstr. h1529.
Based on results obtained in 3-year-old arabica coffee on Lipa clay loam in the Philippines the use is advocated of a complete fertilizer, 12–12–12, at a

rate of 600 g. per tree per year, supplemented with 120 g. of ammonium sulphate. The fertilizers were placed in holes 5 cm. deep, dug 60 cm. from the tree base and spaced equally around it.

6158. Loué, A.
Mineral nutrition of robusta coffee plant and its manuring in Ivory Coast.
Fertilité, 1958, No. 5, pp. 27-60, bibl. 11, illus.

This survey is in 3 parts. The first is devoted to a description of the climate and soils of the coffee growing areas of the Ivory Coast. In the second part the results of fertilizer trials in these areas are given, from which it is concluded that foliar diagnosis gives a fairly accurate picture of the plant's requirements of N, P, K, Ca and Mg. Various social and economic reasons are advanced in the third part to explain the difficulty of ensuring that an adequate nutritional status is maintained in coffee plantations.

6159. Accorsi, W. R., and Haag, H. P.
Alteracões morfológicas e citológicas do cafeeiro (*Coffea arabica* L., var. Bourbon (B. Rodr.) Choussy) cultivado em solução nutritiva, decorrentes das deficiências e excessos dos macronutrientes. (**Morphological and cytological changes in Bourbon coffee cultured in nutrient solutions with deficiencies and excesses of macronutrients.**) [English summary ½ p.]
Rev. Café portug., 1959, **6**(23): 5-19, bibl. 21.

The elements concerned were N, P, K, Ca, Mg and S. Clear-cut symptoms were observed in the N, P, Ca, Mg and S deficiency treatments and the S excess treatment. The greatest anatomical changes were those in the Mg deficiency and the P and S excess treatments. They chiefly concerned the chloroplasts, which lost their green colour and coalesced into irregular masses.—Esc. sup. Agric. Luiz de Queiroz.

6160. Robinson, J. B. D.
Amber beans.
Kenya Coffee, 1960, **25**: 91-3, bibl. 3, illus.

Amber beans were found to be produced to the extent of 15–30% on branches with iron-deficient leaves. To avoid loss of quality the separate collection and processing of cherries from trees with chlorotic foliage are advised.

6161. Gopalakrishnan, R., and Ananth, K. C.
Transpirational studies on coffee—(preliminary).
Indian Coffee, 1960, **24**: 20-8, bibl. 15.

In arabica coffee 34% of transpiration was from the upper surface of the leaf, and the rate rose appreciably in seedlings infected with leaf disease and brown eye spot. *C. liberica* and *C. canephora* had higher transpiration rates, and *C. excelsa* a lower rate, than *C. arabica*. Spraying the lower or both leaf surfaces with bordeaux reduced transpiration considerably.

6162. Littlehales, J. C. G.
Irrigation in coffee.
Kenya Coffee, 1960, **25**: 97, 99.

Flood irrigation is more economical in water but overhead sprinkling is cheaper in labour, more versatile and enables fertilizers and insecticides to be applied effectively.

6163. Venezuela Ministry of Agriculture and Animal Husbandry.
Cultivo de cafetales mediante uso de "coberturas muertas". (**Coffee growing with the aid of mulches.**)
Agric. venezol., 1959, **23**(213): 35-8, illus.

In trials with bourbon coffee, planted in 1955 on moderately fertile, slightly acid, sandy loam at the Coffee Experiment Station at Bramón, Rubio, in Táchira State, the comparative yields of cherry per ha. given by the different treatments in 1957–58 were: 1,732 kg. with normal cultivation, 1,250–1,900 kg. with 3 different cover crops, 2,330 kg. with compost plus cattle manure and 4,480 kg. with a 10 cm. mulch of chopped banana stems. The corresponding figures for 1958–59 were: 6,200 kg., 2,980–3,985 kg., 7,360 kg. and 14,240 kg.

Coffee—diseases and pests.

(*See also* 6161, 6299.)

6164. Indian Coffee Board Research Department.
Die-back disease in Saklaspur and North Coorg areas.
Indian Coffee, 1960, **24**: 29, 44.

The cause is considered to be the severe drought of 1958–59, accentuated by heavy over-cropping on old wood, heavy defoliation, exposed conditions through inadequate shade and limited soil moisture reserves.

6165. Firman, I. D.
A coffee seedling disease.
Kenya Coffee, 1960, **25**: 130, 135.

The symptoms resemble "hot and cold" disease, and a *Fusarium* sp. has been isolated from the lesions. Attacks can be minimized by ensuring that only strong, healthy seedlings are established.

6166. van Emden, J. H., and van Suchtelen, N. J.
Zeefvatenziekte en koffiekanker. (**Phloem necrosis and coffee canker.**) [English summary ½ p.].
Surinaam. Landb., 1959, **7**: 111-14, bibl. 10.

It is shown that wilting of mature coffee trees in Surinam can be caused by canker (*Ophiostoma coffeae*), a recently introduced disease. Phloem necrosis, which causes similar wilting symptoms, may be present in the same plantations.

6167. Raj, T. R. N., and George, K. V.
A disease of coffee hitherto undescribed from India.
Indian Coffee, 1960, **24**: 120-2, bibl. 9, illus.

For control of leaf spots, caused by *Sclerotium coffeicola*, sanitary measures, the application of 2% bordeaux, wider spacing and proper attention to pruning are recommended.

6168. Seixas, C. A.
Neblina insecticida no combate a broca. **(Low volume spraying for coffee berry borer control.)**
São Paulo Agrícola, 1959, **1**(11): 14-20, illus., from *Trop. Abstr.*, 1960, **15**, Abstr. h 1528.

Promising results against *Hypothenemus* [*Stephanoderes*] *hampei* with low-volume sprays of BHC dissolved in diesel oil, using fogging equipment at daybreak.

6169. Anon.
Época certa de polvilhar cafézais contra a broca. **(The right time to dust coffee plantations for borer control.)**
Biológico, 1960, **26**: 16.

Good control of coffee berry borers (*Stephanoderes hampei*] depends on applying 1% BHC dust at the crucial time. Samples of berries should be examined from late September onwards (in S. Paulo), and treatment should be started before the infestation exceeds 5%. The 2nd application should follow in 20 days, and a 3rd may be necessary if rain intervenes. The product is applied at 40–45 kg. per 1,000 plants.

6170. Fernández, A.
Las escamas palomillas del cafeto en Venezuela. **(Coffee mealybugs in Venezuela.)**
Inf. Serv. Shell Agric., Cagua, **11**, 1958, pp. 29, bibl. 6, illus.

Chlorinated insecticides were found more effective than phosphoric esters, and dusts more practical and economic than emulsions because of topography and water scarcity. Both the mealybugs (*Neorhizoecus coffeae*, *Toumeyella* sp. and *Pseudococcus* spp.) and the associated ants (mainly *Rhizomyrma* spp.) can be successfully controlled by dusting with either 10% aldrin or 20% chlordane, spreading 50 g. of the commercial product in a circle of radius 30–40 cm. round the base of each plant and covering the insecticide thinly with soil. Nursery soils should be treated before planting, with 1 l. of either 24% aldrin, 40% chlordane or 19·5% endrin per 200 l. of water, using 2 l. of solution per sq. m.

Coffee—processing and by-products.

6171. Keeler, J. T.
Costs and returns in processing cherry coffee on farms in Kona, Hawaii.
Agric. Econ. Rep. Hawaii agric. Exp. Stat. **40**, 1959, pp. 24, illus.

Up to the point where a single plant was handling about 80,000 lb. of cherry, a notable decrease in the cost per lb. was evident as the volume increased. Above 80,000 lb. there was very little cost advantage in increasing the scale of operation. [From author's summary.]

6172. Oliveira, A. dos S.
Cinco estudos sobre café. II to V. **(Five studies on coffee. II. Loss of moisture during kiln drying. III. Preliminary study on moisture. IV. Study on arabica cherries. V. Investigation on weight and volume changes of coffee during drying.)**
Rev. Café portug., 1959, **6**(22): 55-61, bibl. 2, 61-8, bibl. 7; **6**(23): 77-81, bibl. 9, illus., and 82-6.

Parts II and V concern moisture losses in *Coffea arabica*, *C. canephora*, *C. liberica* and *C. racemosa* during drying. Part III is a comparison of 4 methods of determining moisture. Part IV describes a microscopic study of the external characters and internal anatomy of the fruit. [For part I, see *H.A.*, 30: 1291.]

6173. McLoy, J. F.
Skin drying in batch driers.
Kenya Coffee, 1960, **25**: 94-6.

Of 32 samples of coffee skin-dried in a Wilken drier at 120° F. or in a tray drier at 100–110° F. 26 showed no change in quality classification compared with the fully sun-dried product. No liquor classified as "fair" was soured by machine drying. [See also *H.A.*, 29:4059.]

6174. Kiehl, E. J.
A palha do café como adubo. **(Coffee waste as a fertilizer.)**
Bol. Super. Serv. Café S. Paulo, 1959, **34**(389): 5-6.

The skin and pulp from coffee berries contains about 1% of N and 2% each of P and K. When this was allowed to ferment for 78 days it gave very good results as a manure for lettuce. There was some response to waste fermented for only 44 days, but a minimum of 60 days appears necessary for good results.

Guavas.

6175. Balasubrahmanyam, V. R.
Studies on blossom biology of guava (*Psidium guajava* L.)
Indian J. Hort., 1959, **16**: 69-75, bibl. 6.

In all 3 varieties studied there were 2 flowering seasons, September–October and January–March. Bud development took 30 days to flower opening, which occurred during the morning. The stigma was receptive from 2–3 hours after opening for 48 hours, and pollen remained viable for 4 hours.—Annamalai Univ., Madras.

Mangoes.

(*See also* 6311, 6312, 6322.)

6176. SINGH, K. K., SINGH, S., AND CHADHA, K. L.
Effect of some plant regulators on fruit drop in mango.
Indian J. Hort., 1959, **16**: 86-91, bibl. 8.
See *H.A.*, 30: 2919.

6177. KAUSAR, A. G.
Malformation of inflorescence in mango.
Punjab Fruit J., 1959, 22(79): 19-21, bibl. 6.
Symptoms and damage; it is attributed to a virus.

6178. RAMANATHAN, J. D., AND SESHADRI, T. R.
Constitution of mangiferin.
Curr. Sci., 1960, **29**: 131-2, bibl. 5.
Further confirmation of a tetrahydroxy-xanthone glucoside structure.

Oil palms.

(*See also* 6081-6083, 6140, 6300, 6301, 6306.)

6179. HADDON, A. V., AND TONG, Y. L.
Oil palm selection and breeding: a progress report.
Malay. agric. J., 1959, **42**: 124-56, bibl. 12, illus.
Some of the data are presented, on which progenies and individual palms have been selected. The failure of the Dumpy *dura* palms is particularly mentioned. Current research is directed towards improving the popular *tenera* strain.

6180. DESNEUX, R., AND MAHY, C.
À propos d'une méthode simplifiée de germination des graines du palmier à huile. **(A simplified method of germinating oil palm seeds.)**
Bull. Inf. I.N.É.A.C., 1960, **9**: 43-8, bibl. 1, illus.
Modifications are proposed in the method previously described [see *H.A.*, 29: 4064]. The germinating trench should be slightly shallower and longer, viz. 0·7 m. deep, 4·2 m. long and 1·2 m. broad. It should contain 5 half-drums instead of 4, the capacity of the trench thus being increased to 25,000 *dura* or 50,000 *tenera* seeds. To avoid spade injury during regular inspection the seeds are placed in nylon mosquito netting which can easily be lifted out of the drums. Notes are given on technique, labour and results.

6181. BROESHART, H.
Fertilizer placement studies by means of radioisotopes. [French and German summaries 12 and 11 lines.]
Z. PflErnähr. Düng., 1959, **84**: 76-80.
See *H.A.*, 29: 4065.

6182. BULL, R. A.
Macronutrient deficiency symptoms in the cocoyam (*Xanthosoma* sp.).
J.W. Afr. Inst. Oil Palm Res., 1960, **3**: 181-6, bibl. 4, illus.
Coloured illustrations with accompanying descriptions are given of N, K, Mg, Ca, S and P deficiency symptoms in a crop which is commonly grown in association with oil palms and which may be used to indicate mineral disorders in the permanent crop.

6183. SPARNAAIJ, L. D.
The analysis of bunch production in the oil palm.
J.W. Afr. Inst. Oil Palm Res., 1960, **3**: 109-80, bibl. 21.
The effects of cultural treatments on sex ratio, leaf production, floral abortion, bunch failure and average bunch weight have been studied. It was found that intercropping increased yields significantly in the early years, and that this was due to stimulated leaf production in the years before flowering and to a more favourable sex ratio thereafter. This improvement is considered to be due to a reduction of soil N by intercropping. A pruning experiment, a manurial trial and an establishment experiment are described, and the practical implications of the results for plantation practice discussed.

6184. ANON.
When to start harvesting [oil palms].
J.W. Afr. Inst. Oil Palm Res., 1960, **3**: 187-8.
An experiment is described, in which harvesting was started in the first plots at 2½ years after planting. Thereafter harvesting in other plots began at 6-month intervals until the first harvest was taken in the last plots at 6½ years after planting. Cumulative (1953–58) and average yields showed that harvesting may be delayed until 4½ years after planting, but also that with vigorous palms yields after 3 years may justify harvesting.

Papaws.

6185. ALLAN, P.
Papaw season can be extended artificially.
Fmg S. Afr., 1960, **35**(12): 6-10, 13, illus.
The possibility of inducing out-of-season papaw production by artificial means in the cooler, subtropical parts of South Africa is discussed. Pollen can be stored for up to 6 months if kept cool, and hand pollination early in the season can increase the number of seeds per fruit and fruit size. Removal of all fruits which set early in the season has encouraged vigorous trees to flower throughout the winter, and when hand pollinated, these flowers have produced fair-sized fruits maturing out-of-season. More research is planned, but in the

meantime it is recommended that growers carry out trials, removing a portion of the crop which would mature during the glut period, thereby inducing more out-of-season fruiting.—Univ. Natal, Pietermaritzburg.

6186. Blake, C. D.
Taking toll of papaws.
Banana Bull., 1960, **23**(1): 7.

Powdery mildew can be controlled by spraying at 3–4-week intervals with lime-sulphur or wettable sulphur or by dusting with sulphur, starting in May and continuing until October. The under-surfaces of young crown leaves and the young fruit are most susceptible and their complete coverage should be ensured.

Pineapples.

(*See also* 5306, 5307, 6301, 6313, 6314, 6332.)

6187. Philippe, J.
La culture de l'ananas en Guinée, en Côte-d'Ivoire et au Cameroun (sous administration française). (**Pineapple growing in Guinea, Ivory Coast and Cameroun under French administration.**) [Flemish summary 4½ pp.]
Bull. agric. Congo belge, 1960, **51**: 27-60, bibl. 18, illus.

The subjects discussed include: soils—poor, acid or sandy soils in Guinea and Ivory Coast, but fertile, volcanic soil in Cameroun; varieties—Baroness Rothschild, Smooth Cayenne; spacing—generally double lines, in Guinea commonly 90–120 cm. lanes between adjacent pairs of lines, a 30 cm. interline and quincunx spacing of the plants at 40 cm. apart in the double lines; density—commonly 33,000–40,000 plants per ha.; planting material—generally axillary suckers of medium weight; planting date; soil cover—mulched interlines; soil conservation; fertilization—abundant mineral fertilization in Guinea and Ivory Coast, but usually none in Cameroun, common dressings in Guinea being 15 or 20 g. sulphate of ammonia, 4·5 g. superphosphate and 16·6 or 8·3 g. K_2SO_4 per plant applied 2–3 weeks, 3–3½ months and 7–8½ months after planting; irrigation; control of flowering by treatment with acetylene or NAA; partial or total destruction of the crown by gouging or twisting off to facilitate packing, increase fruit weight and stimulate suckering; rotations; pests, including nematodes and *Pseudococcus brevipes*; harvesting and packing.

6188. Kanapathy, K.
Visual symptoms of major nutrient deficiencies of the Singapore Spanish pineapple.
Malay. agric. J., 1959, **42**: 157-60, bibl. 2, illus.

Plants grown in sand culture were treated with nutrient solutions, from each of which one of the elements N, P, K, Ca and Mg was omitted. N deficiency resulted in stunting and yellowing of the plant, delayed and deformed fruiting; P deficiency in darker green leaves with the development of a purple colour and also sour watery fruit; K deficiency in stunted growth, leaf spotting and poor quality fruit; Ca deficiency in soft, flat, dark green leaves and tasteless fruit; and Mg deficiency in pale greenish-yellow leaves and sour fruit lacking firmness.

6189. Py, C., and others.
Fertilizing pineapples in Guinea.
Fertilité, 1957, No. 3, pp. 5-25, illus.

The effects of applying N, P, K, Ca, Mg, Fe, Zn, Cu, S, Mn and B on the growth, yield, composition and quality of pineapples are discussed. Methods of application are described, together with notes on recommended timing and specimen fertilizer programmes. [See also *H.A.*, 26: 2224 and 29: 906.]—Inst. franç. Rech. fruit. Outre-Mer.

6190. Samuels, G., and Gandía Díaz, H.
Effects of potassium chloride and sulfate on pineapple yields and quality. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1960, **44**: 16-20, bibl. 6.

On a sandy clay soil pineapples fertilized with sulphate of K gave a higher yield per acre and a larger mean weight per fruit than plants fertilized with chloride of K. The chloride-fertilized pineapples produced a fruit with off-coloured pulp, not as acceptable as the standard sulphate-fertilized fruit. The possible roles of the chloride and sulphate ions in pineapple yields are discussed. [From authors' summary.]

6191. Blake, C. D., and Walker, J.
Pineapple wilt.
Agric. Gaz. N.S.W., 1959, **70**: 638-41, illus.

The symptoms and occurrence of wilt are described. It can be caused by root destroying fungi, insect larvae, mealy bugs or nematodes, and thus it is not possible to recommend any single reliable control measure.

6192. Carter, W.
A study of mealybug populations (*Dysmicoccus brevipes* (Ckl.)) in an ant-free field.
J. econ. Ent., 1960, **53**: 296-9, illus.

In a pineapple field which was kept free from ants leaf colonies of mealybugs remained small on both sprayed and unsprayed plots. Subterranean colonies developed in the absence of ants, causing wilt in scattered plants. [An aerial photograph used to show the location of the wilted plants is an impressive example of the use of this technique in surveying an experimental field.—Ed.]—Pineapple Res. Inst., Hawaii.

6193. HEINRICH, W. O.
Experiências para combate à *Thecla basilides* (Geyer, 1837), broca do abacaxi (Lepid. Lycaenidae). **(Trials on the control of the pineapple borer, *Thecla basilides*.)** [English summary ½ p.]
Arq. Inst. biol. S. Paulo, 1958, **25**: 109-19, bibl. 8.

In a preliminary trial, in which the 10 insecticides compared all gave statistically equivalent results, the best control was given by lead arsenate, namely 77% clean fruit compared with 51% in the control. In a second trial, in which spraying took place 6 times at fortnightly intervals beginning in early November, 3 products were significantly better than the others and gave 70 to 85% clean fruit compared with 40% in the control. These were: (1) 0·1% Tobacene (containing 0·025% DDT plus 0·028% methylnaphthalene plus 12% nicotine and other hydrocarbons) at 1872 l. per alqueire (2·42 ha.), (2) 0·005% parathion at 1836 l., and (3) 0·010% parathion at 1880 l.

Rubber trees.

(*See also* 5308, 6081, 6082, 6084, 6280, 6282, 6301.)

6194. RUBBER RESEARCH INSTITUTE OF MALAYA.
Annual Report of the Rubber Research Institute of Malaya for 1958, Kuala Lumpur, [1960], pp. 123, $(Malay.) 3.

Soils division: N fertilization increased the growth rate in 9 trials and P in 6, whereas K gave an increase in 1 and a decrease in 3. N and P also gave increased yields, and there were indications of a positive interaction between N and K. As herbicides dalapon and aminotriazole were the most persistent, the former giving good control of *Axonopus compressus*, the latter of *Paspalum conjugatum.* The best routine control along rubber planting rows was obtained with $NaClO_3$ spray at 2-month intervals. The growth of mixed legume covers was markedly improved by 3 cwt. of rock phosphate per acre. *Botanical division:* The most promising clones appeared to be RRIM 600, 603, 605, 606, 607, 610 and 623. Over 11 years of tapping the yields from half spiral alternate daily tapping exceeded those from full spiral fourth daily tapping on all clones except one in 1 experiment. *Pathological division:* Mercurized copper oxychloride proved to be the most efficient fungicide against bird's eye spot. Persistence of dieldrin and aldrin was found to vary with soil type, and neither these nor other chlorinated hydrocarbons showed persistence in peaty soils. Aldrin was effective against the cockchafer *Holotrichia bidentata. Chemical division:* Treatment of the scraped tapping panel with vaseline containing an antibiotic gave yield increases comparable with those obtained with 2, 4, 5-T.

6195. ANON.
Planting materials used in Malaya, 1955-8.
Plant. Bull. R.R.I.M., 1960, No. 49, pp. 72-80.

Analysed by districts and clonal groups.

6196. ANON.
RRIM 600 series clones in estate trials.
Plant. Bull. R.R.I.M., 1960, No. 48, pp. 49-59, illus.

Details of preliminary tappings and clone characteristics.

6197. BEAUFILS, E. R.
Research for rational exploitation of the hevea using a physiological diagnosis based on the mineral analysis of various parts of the plant.
Fertilité, 1957, No. 3, pp. 27-38, illus.

The method of "physiological diagnosis" developed by the author is described. By determining the accumulation of added nutrients in various tissues of the rubber tree it has been found possible to elucidate its precise mineral requirements at different seasons and at different stages of growth. Requirements of N, P, and K are highest during refoliation, from mid-November to mid-February, and of Ca at the beginning of May. Copper sulphate can be added to NPK mixtures but not to a lime dressing. Tricalcium phosphate is not a suitable source of P for alleviating P deficiency. [For earlier accounts in French, see *H.A.*, 27: 2920, 28: 4119 and 29: 913 and 4077.]—I.R.C.I.

6198. ROSSETTI, V.
Doenças da seringueira. **(Diseases of hevea.)**
Biológico, 1959, **25**: 233-43, illus., and 266-72, bibl. 13, illus.

Control measures for South American leaf blight, mildew, *Phytophthora* wither-tip, spotted anthracnose, target spot, leaf spot, black crust, anthracnose, pink disease, stem canker in the nursery, *Diplodia* rot, various root rots, mouldy rot of the tapping panel and brown bast.

6199. R.R.I. CEYLON, PLANT PATHOLOGY DEPARTMENT.
Minor pests of rubber plantations.
Quart. J. Rubb. Res. Inst. Ceylon, 1959, **35**: 86-92.

Control measures are indicated for various mammals, snails and slugs, and for the less important insect pests, such as termites, scales, mealybugs, cockchafer grubs, borers and mites.

6200. ANON.
How variations in field latex influence latex concentrate quality.
Plant. Bull. R.R.I.M., 1960, No. 48, pp. 60-5.

A high dry rubber content and mechanical stability with a low volatile fatty acid content and KOH number in the field latex lead to good quality in the subsequent concentrate.

Sugar cane—general.

(*See also* 4639, 6301.)

6201. MAURITIUS SUGAR INDUSTRY RESEARCH INSTITUTE.
Annual Report of the Mauritius Sugar Industry Research Institute for 1959, 1960, pp. 102 + xxv, illus., with a summary in French in *Rev. agric. sucr. Maurice*, 1960, **34**: 62-91.

Cane breeding and selection: Preliminary results indicated that more seedlings could be obtained by crossing inside the greenhouse than outside. Pre-release testing of 72 varieties was carried out, and among the more promising were ten M. seedlings and Ebène 50/47. *Nutrition and soils:* Urea proved inferior to ammonium sulphate at the rates used in Mauritius, and higher levels of N fertilization gave smaller increases in total sugar and greater depressions of sugar content in local varieties than in imported strains. *Cane diseases:* The varieties M.202/46 and 93/48 were found to be susceptible to ratoon stunting disease. In an experiment on the heat treatment of cuttings against ratoon stunting the germination of B.37172 was the least affected, that of M.147/44 was erratic, that of Ebène 1/37 was appreciably reduced, and M.134/32 did not stand the treatment at all well. Resistance of local varieties to Fiji disease was tested in a highly contaminated area in Madagascar. *Cane pests:* Soil fumigation with ethylene dibromide gave striking improvements in yield on certain sandy soils. *Weed control:* DCMU was more effective than CMU, particularly in the most humid localities. DCMU + sodium chlorate effectively controlled *Paspalidium geminatum*, DCMU or simazine + Amizol or Dowpon controlled *Heliotropium amplexicaule*, but Dowpon alone was the most efficient herbicide against *Typha javanica*.

6202. COIMBATORE.
Annual Reports of the Sugarcane Breeding Institute, Coimbatore, for 1956-57 and **1957-58,** 1959, pp. 112 and 104.

Breeding: Synchronized flowering of certain early and late varieties has been achieved by photoperiodic treatment. *S. robustum* was successfully crossed with an *S. officinarum* variety with little reduction in juice quality but diminished vigour. *S. spontaneum* was successfully used as pistil parent in crosses with *Narenga*, *Sclerostachya* and *Erianthus* spp. *Botany:* The retardation of flowering by increase in latitude was found to be 2·4 days per degree. *Physiology:* Control of the vegetative growth period and flowering by photoperiodic treatment was established, and certain strains of *S. spontaneum*, which had not flowered previously, were induced to flower. *Mycology:* A rapid method for testing resistance to red rot was developed. In some *S. spontaneum* crosses resistant parents produced progeny heterogeneous for resistance. Smut resistance has also been found in some *S. spontaneum* variants. *Entomology:* Potential parasites of the sugar cane scale (*Targionia glomerata*) have been recorded. Folidol was found to control leaf mite (*Schizotetranychus andropogoni*), and BHC, chlordane and aldrin were effective against 2 pigmy gryllids. Roguing and burning, with occasional spraying with 0·02% Folidol emulsion, reduced damage by scale (*T. glomerata*) effectively.

6203. INDIAN INSTITUTE OF SUGARCANE RESEARCH, LUCKNOW.
Annual Report of the Indian Institute of Sugarcane Research, Lucknow, for the year ending 31st May, 1958, 1959, pp. 90.

Agronomy: The varieties Co. 976, 1058, 1062 and 1096 performed well in trials. Late ripening varieties were found more suitable for autumn planting than early or mid-season strains. In a time-of-planting experiment the number of shoots was highest with August planting, the next being the September planting. This order was reversed in the yield figures, September planting giving the largest crop. Tillering in Co. 453 was most active from mid-May until the end of June, by which date 90% had formed. *Entomology:* Environmental factors favouring attack by stalk borer (*Chilotraea auricilia*) were elucidated, and a combination of mechanical and chemical control gave an appreciable reduction of infestation. Mechanical control alone was successful in combating stem borer (*Chilo tumidicostalis*) and white grub (*Lachnosterna consanguinea*). Chlordane, alone or combined with Aretan or Agallol, improved germination and protected buds from termites. *Mycology:* Perenox and Cupravit, while reducing red rot (*Colletotrichum falcatum*), did not control it completely. Co. 527 and 449 and CoS. 416 and 109 proved resistant, and CoS. 510 highly susceptible, to smut. A new chlorotic disease appeared to be viral in origin and responded to hot water treatment. *Agricultural chemistry and soil science:* Organic P in cane soils was found to be highly correlated with total P, and yield was inversely related to N content. These soils were deficient in P but contained adequate K. *Agricultural engineering:* Effective control of weeds by flaming could be obtained when they were 1–2 in. high, but with *Cyperus rotundus* the effect was only temporary. Some tractor and bullock drawn planting and cultivating implements were tried, one of which has been approved for commercial development.

6204. BREGGER, T., AND OTHERS.
A review of sugarcane research in Florida—1939-1959.
Sugar J., 1960, **22**(10): 17-23, bibl. 20, illus.

Breeding: In this period the Canal Point Field Station released 15 complex tri-species hybrid varieties, of which C.P. 34-120, 36-105 and 44-101 were the most important. *Soils and fertilizers:* The peaty soils of the Everglades have been found to respond to heavy dressings of Zn and Cu, but not to N, Mg or Ca. The optimum dosage of K proved to be 200 lb. per acre of either muriate or sulphate. An application of 80 lb. per acre of triple superphosphate is now generally recommended. *Phytopathology:* No practical controls have been found for either mosaic or red rot, but ratoon stunting disease has responded to heat treatment of setts. *Entomology:* Pre-harvest burning has kept the borer population in check. Heptachlor, chlordane and aldrin have proved effective against wireworm and white grub, demeton, malathion and parathion against yellow aphis, and endrin against the lesser cornstalk borer. Much work has been done in releasing predators for pest control, the most successful being *Anagyrus antoninae* for scale control.

6205. Larkin, L. C., and Updike, A. W.
Marketing margins for sugar.
Mktg Res. Rep. U.S. Dep. Agric. **311**, 1959, pp. 16.

An analysis of the difference between the prices paid to the grower and by the consumer for beet and cane sugar.

Sugar cane—breeding and varieties.

(*See also* 6201-6204, 6246, 6310, 6322.)

6206. Panje, R. R.
Studies in *Saccharum spontaneum*. Recent collection of *Saccharum spontaneum* in tropical and sub-tropical Asia and Africa.
Indian J. Sugarcane Res., 1957, **1**: 61-4, bibl. 8, [received 1960].

Notes on a collection of 57 variants made in 11 countries in 1955–56. [See also *H.A.*, 30: 1334.]

6207. Barrett, E. R.
Selection in bunch and single planted sugarcane seedling nurseries at Louisiana State University.
Diss. Abstr., 1960, **20**: 2482-3, being *L.C. Card No. Mic.* 59-5507 of 90 pp.

Criteria for selection were Brix, sucrose, stalk diameter, height and weight.

6208. Wilson, J.
Pre-release testing of new varieties and control of sugarcane diseases.
S. Afr. Sugar J., 1960, **44**: 205-7.

To prevent breakdown of the disease resistance of new varieties through early and severe infection it is recommended that the nurseries be kept completely disease free and very fertile, that commercial crops be established from such nurseries using all practical precautions to prevent contamination, that these crops be inspected and rogued regularly, and that the seed nurseries be replanted at frequent intervals to reduce the risk of transmitting latent infections.

6209. Raheja, P. C., and Singh, D.
Growth studies in *Saccharum spontaneum*—VI. Variability in the characters of stalks in clumps.
Indian J. Sugarcane Res., 1957, **1**: 72-8, bibl. 8, [received 1960].

The performances of the various classes of shoots emerging on different dates from plants of Co. 290 were investigated. Most plants had less than 5 shoots, of which the first 3 were the most vigorous.

6210. Khanna, K. L., Sharma, S. L., and Srivastava, R. C.
Outstanding canes of Bihar. 1. B.O. 3: highly resistant to red rot water-logging.
Indian J. Sugarcane Res., 1957, **1**: 96-102, bibl. 9, illus., [received 1960].

This mid-season variety is a consistent performer, resistant to top and root borer and to *Pyrilla*. [For part II, see *H.A.*, 28: 1998f.]

6211. Khanna, K. L., Sharma, S. L., and Srivastava, R. C.
B.O. 29: a new variety of Bihar.
Indian J. Sugarcane Res., 1957, **1**: 105-6, illus., [received 1960].

A mid-season, high-yielding cane, moderately resistant to borers and highly resistant to smut.

Sugar cane—climate, culture and irrigation.

(*See also* 5309-5314, 6202, 6203, 6230, 6301.)

6212. Khanna, K. L., and Sehgal, B. R.
Studies in crop weather relationship—I. Influence of rainfall on the yield of sugarcane.
Indian J. Sugarcane Res., 1957, **1**: 85-95, bibl. 1, [received 1960].

Whereas there would appear to be no significant correlation between monthly rainfall figures and yields, response curves indicated that in Bihar an additional inch of rain above normal was beneficial in January, May and June, but deleterious in February, March, part of April, August and September.—Cent. Sugarcane Res. Inst., Pusa.

6213. Swan, A. D.
The effects of tropical cyclones on the sugar crop in Mauritius. III. Two or more cyclones in one year.
Rev. agric. sucr. Maurice, 1960, **39**: 57-60.

Data for 16 years, in which 2 or more cyclones occurred, are used to establish figures for the theoretical damage caused, and the difference between these figures and the assumed damage from other causes in a normal cyclone-free year is taken to represent the actual damage attributable to cyclones. The average computed damage amounted to 28% for each year in which 2 or more cyclones occurred. The analysis suggests that in any one year the total damage caused by 2 or more cyclones is the same as the sum of the damage which would have been caused by each cyclone had it occurred in a single-cyclone year. [For earlier parts, see *H.A.*, 28: 1999k and 30: 1366.]

6214. CRUZ, S. R., AND OTHERS.
Mechanized land preparation *vs.* animal land preparation in the production of sugarcane.
Araneta J. Agric., 1959, **6**: 145-59.

A thorough statistical examination was made of the returns of all cane farms, in factory groups, in the Philippines for the period 1947–1955. The increases in average yield attributable to mechanized cultivation were highly significant and ranged from 9·87 to 47·63 tons cane per ha. per annum.

6215. ARCHIBALD, T. D.
Soil conservation on steep slopes and hillsides.
S. Afr. Sugar J., 1960, **44**: 209-17, illus.

In addition to contour planting of sugar cane the author advocates the following: breaking up the field into strips to suit the transport; short periods of fallow or, on steep hills, no fallow; keeping the maximum amount of trash in the fields by not burning; ploughing in as much trash as possible; and keeping the roads and tracks in newly planted cane covered with trash or dead weeds.

6216. YADAVA, V. S.
Monsoon planting to increase acre-yield and quality in North India.
Indian J. Sugarcane Res., 1960, **4**: 78-87, illus.

Losses through poor germination and rotting of setts planted in the monsoon were prevented by planting them on raised beds in a nursery and subsequently transplanting.—Samastipur Central Sugar Co., Bihar.

6217. WILSON, J.
The controversial and important subject of trashing.
S. Afr. Sugar J., 1960, **44**: 289-95.
Trashing.
Bull. S. Afr. Sugar. Ass. Exp. Stat., **12**, 1960, pp. 6.

It is maintained that trashing should be carried out under all normal, dryland farming conditions and that burning should be resorted to only when (a) ploughing out, (b) the soils are subject to waterlogging, (c) low temperatures may retard ratoon growth, or (d) the area is subject to annual frosts. Nevertheless, on fertile and moist alluvial soils or on dryland soils without erosion risk and with unrestricted irrigation supplies burning may sometimes be practised with advantage.

6218. SKINNER, S. O., AND FRESHWATER, I. T.
The rotary slasher—a new machine for cane destruction.
Cane Grs' quart. Bull., 1960, **23**: 119-22, illus.

Consists of 4 horizontal blades attached to a revolving ground plate driven by the tractor PTO.

6219. HSU, W.-C.
A report on the irrigation of sugar cane in Taiwan.
Sugar J., 1960, **22**(9): 23-7.

The advantages of overhead irrigation are compared with those of surface irrigation. The comparative costs of overhead and furrow irrigation with different water sources are tabulated, and the total water requirement for a sugar cane plantation is discussed. A Bouyoucos meter is described, which has been widely used in Taiwan to determine the effective water content of the soil. Alternatively, the period of application of water may be based on an irrigation cycle, which is shown. The construction of deep wells has increased production in Taiwan by as much as 54%.

6220. SINGH, H., ADLAKHA, P. A., AND THAKUR, M. M. S.
Some irrigational studies with important sugarcane varieties in the Punjab.
Indian J. Sugarcane Res., 1960, **4**: 103-10, bibl. 9.

Liberal irrigation increased tiller production and stalk length, and caused a greater proportion of the total growth to be made in the pre-monsoon period. It resulted in more, longer and broader leaves, more internodes, greater thickness and linear growth and the highest yield of millable cane, with little effect on juice quality. The early variety Co.L. 29 showed the least response to various irrigation levels, and Co. 312 was the most drought resistant.

Sugar cane—nutrition.

(*See also* 6201, 6203, 6204.)

6221. DEMETERIO, J. K., AND OTHERS.
Preliminary studies on the quantitative aspects of fertilization [of sugar cane].
Sugar News, 1960, **36**: 21-2.

A formula to provide a guide on fertilization based upon soil analysis is described, together with field experiments carried out to test it.—Philipp. Sugar Inst.

6222. SAMUELS, G., LANDRAU, P., JR., AND ALERS-ALERS, S.
Influence of height of cane and leaf stage at time of sampling of leaf-nutrient content of sugarcane. [Spanish summary ½ p.]
J. Agric. Univ. P. R., 1960, **44**: 11-15, bibl. 3.

There was no significant difference in leaf N or K between cane tillers aged 3 months with heights of 12, 24, and 36 inches. Variations in cane height at the time of sampling did influence leaf values. The number of leaves present at time of sampling (7–13 weeks) did not influence leaf nutrient values in general, except for N and P at 9 weeks of age. Here the trends of this influence with the two varieties studied were contrary. [From authors' summary.]

6223. B[IESKE], G. C.
Influence of filter mud on seed germination.
Cane Grs' quart. Bull., 1960, **23**: 128-9, illus.

Plots treated with filter mud showed markedly delayed germination of weed seeds. This is attributed to reduced O_2 and increased CO_2 levels in the soil.

6224. MARFORI, R., AND QUERIJERO, G.
Liming and fertilization experiments on sugar cane grown on Angeles fine sand in tanks.
Sugar News, 1960, **36**: 23.

Sugar varieties P.O.J. 2878 and H. 37-1933 were grown in tanks measuring 274 × 87 × 58 cm. Commercial N, P and K fertilizers, copra meal, guano and tobacco dust, applied at rates equivalent to the elements present, agricultural lime, and Soil Sulphaid (20·35% elemental S uncombined) were used in the various treatments. P.O.J. 2878 was attacked by pineapple disease, but, when H. 37-1933 was harvested after 16 months, results showed that the highest yields of sugar were obtained with NPK + 1 ton of agricultural lime to provide a soil pH of 5·5–6·0. Results obtained with organic fertilizers did not compare favourably with those from commercial fertilizers. Soil Sulphaid added to the other treatments reduced yields.

6225. INNES, R. F.
The nitrogen, phosphorus and potassium requirements of sugar cane.
J. Sci. Food Agric., 1960, **11**: 299-309, bibl. 35.

A review, covering diagnosis and responses.

6226. GOLDEN, L. E.
Plant nutrients uptake by sugar cane in Louisiana.
Sugar J., 1960, **22**(11): 21-2.

The results of analyses on crops grown in 5 places are tabulated. The N contents of the aerial parts ranged from 2·62–3·72 lb. per ton, P_2O_5 from 1·19–2·19 lb. per ton and K_2O from 6·90–8·07 lb. per ton.

6227. CHANDRA, P. P.
Manuring for higher yields.
Indian J. Sugarcane Res., 1957, **1**: 117-19, illus., [received 1960].

Average yields of sugar cane have been raised by 35·5% in U.P., 29·9% in Bihar and 25·6% in the Punjab by the use of ammonium sulphate.

6228. KHANNA, K. L., ACHARYA, R. C., AND SINGH, K. P.
Studies on the manurial responses of sugarcane on cultivators' fields—II. The effect of top dressings of ammonium sulphate.
Indian J. Sugarcane Res., 1957, **1**: 77-80, bibl. 3, illus., [received 1960].

Top dressings at 20 and 40 lb. N per acre applied at earthing-up gave average yield increases of 3·1 and 5·6 tons, respectively. [For part III see *H.A.*, 28: 1943.]—Cent. Sugarcane Res. Inst., Pusa.

6229. KANWAR, R. S., AND SINGH, H.
Studies on the relative efficiency and effect of certain nitrogenous fertilizers on soil composition, juice quality and yield of sugarcane.
Indian J. Sugarcane Res., 1960, **4**: 57-63, bibl. 5.

No significant increases in yield of cane were obtained by raising the amount of N applied from 100 to 200 lb. per acre or by varying the fertilizer. With Chilean nitrate, however, the N content of the leaf was higher and the residual N in the soil was lower. FYM and groundnut cake improved the organic carbon status of the soil, and N in general delayed maturity. Ammonium sulphate depressed quality to a greater extent than Chilean nitrate.—Sugarcane Res. Stat., Jullundur.

6230. BAINS, A. S.
Juice quality in sugarcane as influenced by nitrogen with varying levels of spacings and seedrates.
Indian Sugar, 1960, **9**: 637-42, bibl. 11.

The effects on the juice quality of both plant and ratoon crops of applications of 100 and 200 lb. N were studied. Spacing distances were 1, 2 and 3 ft., and planting rates were 25,000, 30,000 and 35,000 two-budded setts per acre. The depressing effect of N on the sucrose content and purity was greatest at the beginning of the season but became less later, and was also less with wider spacings and in the ratoon crops. The ratoon crop had higher juice quality than the plant crop, since the uptake of N was greater in the latter. The C.C.S. per acre was greater with N application, as was the uptake of N by the plant, which was highest during the pre-monsoon period.—Sugarcane Res. Stat., Jullundur.

6231. NARASIMHAM, R. L., AND RAO, N. V. M.
Uptake and utilization of nitrogen by sugarcane as influenced by the time of application. 2. Effects on the composition of juice and gur quality.
Indian J. Sugarcane Res., 1960, **4**: 88-92, bibl. 17.

Better juice quality was obtained when all the 100 lb. per acre top dressing of N was applied within 3 months of planting. Where the total amount was given after 3 months, the non-protein and total N content of the juice rose, reaching a maximum when N was applied after 6 months. Gur quality was highest when half the dosage was given in the first 3 months and the remainder at 4½ months, further delay resulting in an increase in the glucose ratio, organic non-sugar and N contents of the gur. The glucose ratio of the gur was highest and its keeping quality lowest when the second half of the top dressing was given 6 months after planting.—[For part 1, see *H.A.*, 30: 4528.]—Sugarcane Res. Stat., Anakapalle, A. P.

6232. Rao, B. V. V., and Rao, B. B.
Phosphate fertilizing of sugarcane in Mysore.
Indian J. Sugarcane Res., 1960, **4**: 93-6, bibl. 2.

The results of experiments over the past 25 years are summarized. Even at 45 lb. P_2O_5 per acre the responses to P were indefinite, and above this level they were inappreciable. Increased N fertilization appeared to necessitate proportionate increases in P_2O_5 application. Bone meal gave best results when combined with organic N. There was a tendency towards increased yield with placement 3 to 6 in. below the sett.—Dep. Agric., Bangalore.

Sugar cane—diseases and pests.

(*See also* 6201-6204, 6208, 6210, 6211, 6310, 6328.)

6233. Patel, R. M.
Pests and diseases of sugarcane in Bombay State.
Indian J. Sugarcane Res., 1960, **4**: 71-7, bibl. 5.

The incidence of both top shoot borer (*Scirpophaga nivella*) and stem borer (*Chilotraea infuscatella*) has been kept to a low level largely by the destruction of eggs and affected plants. The leaf hopper *Pyrilla perpusilla* has been controlled satisfactorily by aerial spraying. *Ustilago sacchari* has been greatly reduced by cultural methods, but 2 new diseases, twisted top and grassy growth, probably viral, have appeared.—Sugarcane Develop. Scheme, Ahmednagar, Bombay State.

6234. Director, Sugarcane Research, Shahjahanpur, U. P.
Albino disease.
Indian J. Sugarcane Res., 1960, **4**: 111.

This disease can be mitigated by hot water treatment of setts. There are appreciable differences in varietal susceptibility.

6235. Steib, R. J., and Forbes, I. L.
Rate of spread of mosaic disease in Louisiana in 1959.
Sugar J., 1960, **22**(11): 29-31.

Present in 3 out of the 4 major growing areas, and no resistant varieties are available.

6236. Abbott, E. V.
El raquitismo de retoño de la caña de azúcar y forma de dominarlo. (**Ratoon stunting disease of sugar cane and the means of control.**]
Bol. Asoc. Téc. azuc., **17**(7), reprinted in *Suelo Tico*, 1959, **11**(41): 23-9, bibl. 5.

The relative merits of hot air and hot water treatments are discussed. The technique of the latter is described, and recommendations are made for disinfecting harvesting knives.

6237. van der Zwet, T.
Studies on *Phytophthora* seed piece rot of sugarcane and the principal causal organism *P. megasperma* Drechs.
Diss. Abstr., 1960, **20**: 2485-6, being *L.C. Card No. Mic.* 59-5530 of 129 pp.

With a list of resistant and susceptible varieties in Louisiana.

6238. Prakasam, P., and Sarma, M. N.
Influence of host contact on the germination of sugarcane smut spores.
Sci. and Cult., 1960, **25**: 644-5.

6239. Khan, S. A.
Pathogenic effects of *Pratylenchus zeae* on sugarcane.
From abstr. in *Phytopathology*, 1959, **49**: 543.

Pure populations of *Pratylenchus* alone and in combination with a *Phytophthora* sp. were established and maintained on sugar cane in a greenhouse. Top weights of plant cane, but not those of ratoon cane, were significantly lower than the control in pots containing *Pratylenchus*, both alone and in combination with *Phytophthora* sp. *Phytophthora* sp. had two effects: top growth of plant cane was significantly lower, and populations of *Pratylenchus* were higher, in roots containing the fungus.

6240. Anon.
Alternate host of cane borer.
Indian J. Sugarcane Res., 1957, **1**: 103, [received 1960].

Johnson grass (*Sorghum halepense*): spraying 0·1% DDT or 0·1% endrin was partially effective.

6241. Gupta, B. D., and Kulshreshtha, J. P.
Deterioration in the quality and quantity of gur and Khandsari sugar as a result of stalk borer infestation.
Indian J. Sugarcane Res., 1960, **4**: 64-7, bibl. 2.

The severe attack of *Chilotraea auricilia* in 1957/58, when infestation reached 85–100%, resulted in a reduction in the production per acre of gur of 25·8%, and of Khandsari sugar of 20·0–22·7%.—Indian Inst. Sugarcane Res., Lucknow.

6242. Singh, H., Kalra, A. N., and Sidhu, A. S.
Incidence of sugarcane top borer in relation to relative humidity and temperature.
Indian J. Sugarcane Res., 1957, **1**: 81-4, [received 1960].

The maximum damage to sugar cane by *Scirpophaga nivella* in the Punjab was caused by the 3rd brood in late June and early July, and a R.H. above 60% favoured development. Attacks could be minimized by timing irrigations to avoid this critical period.—Sugarcane Res. Inst. Jullundur.

6243. Saplala, V. L.
White grub of sugarcane and its control.
Sugar News, 1960, **36**: 63-5.

For the control of *Leucopholis irrorata* spraying insecticide in the furrows at planting time is recommended. Aldrin at 0·75–1·25 kg. a.i. per ha., BHC at 0·7–1·0 kg. per ha. and chlordane at 0·9–1·5 kg. per ha. have proved effective. Proper field sanitation also helps to reduce infestation.

6244. Moller, R. B.
Poor ratooning investigations, Bundaberg, 1955-1960.
Cane Grs' quart. Bull., 1960, **23**: 112–15, illus.

Most cases were found to be due to soldier fly larvae, against which chlorinated hydrocarbons have been found promising and are being further investigated.

6245. Banerjee, S. N., and Mookerjee, A. L.
***Tanymecus sciurus* Oliv.—a sugarcane pest and its control in West Bengal.**
Indian J. Sugarcane Res., 1957, **1**: 65-8, bibl. 8, illus., [received 1960].

This beetle was effectively controlled by 1% DDT.

Sugar cane—harvesting and storage.

6246. Samuels, G., Alers-Alers, S., and Landrau, P., Jr.
Influence of time of harvest and age of sixteen sugarcane varieties on their sucrose content.
[Spanish summary 1 p.]
J. Agric. Univ. P.R., 1960, **44**: 1-10, bibl. 4.

The varieties were planted together and harvested at 15-day intervals from 6 to 23 months. The average sucrose-percent-cane content reached a peak with a cane of 10·2 months and a sucrose-percent-cane content of 12·08, and another peak at a cane age of 21·6 months with a sucrose-percent-cane content of 12·18. Maximum yields of 96° available sugar for the 16 varieties were reached at a cane age of 18·5 months. The individual varieties displayed a wide variation in sucrose-percent-cane content, with the highest values for M. 336 and the lowest for P.R. 999. The individual varieties displayed marked differences in the time of the year they had their peaks and lows of sucrose. P.R. 902 and M. 336 were the earliest maturing varieties of the 6- to 12-month canes, and B.37161, P.R.905, and P.R.980 were late-maturing. For canes of 18 to 23 months C.A.3874, C.A.38102, and P.R.999 attained their highest peaks of sucrose early, and P.R.903 and P.R.968 late. [From authors' summary.]

6247. Arceneaux, G.
Standards of cane quality in relation to agronomic research and commercial evaluation of mill cane.
Sugar J., 1960, **22**(11): 34-40, bibl. 13.

Discusses and compares the C.C.S. formula of Queensland and the S.E. formula of Réunion with the Houma Station equation.

6248. Guilbeau, W. F., Coll, E. E., and Martin, L. F.
Value of fresh sugarcane to growers and processors.
Proc. Amer. Soc. Sugarcane Tech., reprinted in *Sugar J.*, 1960, **22**(10): 24-6, bibl. 4.

Compared with cane milled within 48 hours of cutting, cane allowed to remain in the field for 5 days produced 15% less recoverable sugar, and that left for 8½ days 22% less.

Tea

(*See also* 6082, 6083, 6300, 6301.)

6249. Dutta, S. K., and Heath, E. D.
Size, shape, and number of plots for field experiments with tea.
Emp. J. exp. Agric., 1960, **28**: 121-32, bibl. 4.

Error was greatly reduced by increasing plot size from 9 to 36 bushes, and the optimum size appears to be 30–45 bushes. Long narrow plots, at least 1½ times as long as broad, were better than square plots. Plot variances for different clones may vary, and, since clonal material is more specific in its requirements and information from experiments using clones may thus be less widely applicable, uniform commercial tea raised from seed may make better experimental material.

6250. Keegel, E. L.
Tea made from clones.
Tea Quart., 1959, **30**: 134-41, bibl. 2.

Lists are given of clones available to Ceylon growers, classified according to the quality of the tea made from them in tests during the past 20 years.

6251. Krishna, K. V. S.
Application of growth substances on clonal cuttings.
Tea Quart., 1959, **30**: 121-3.

The hormone preparations AB 8000 (a solution of equal parts of IAA and IBA in 50% alcohol, the total growth substance concentration being 8000 p.p.m.) and Seradix B gave increased rooting of cuttings with poorly rooting clones, but their use commercially is not justified except in special circumstances.

6252. Harada, S., and others.
Studies on the cold resistance of the tea plant. Parts I to VII.
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1960, No. 7, pp. 4-90, bibls, illus.

Artificial freezing tests showed distinct varietal and seasonal differences in cold resistance. Amylase and invertase activities were negatively correlated, whereas phosphorylase activity was positively correlated with hardiness. Total sugars were positively correlated with cold resistance, but reducing sugars showed no correlation. Nitrogenous substances showed no marked relationship to hardiness, but varieties with higher chlorophyll contents in the winter were hardier. Hardier varieties had sap with a higher refractive index, lower moisture content and higher total sugars than tender varieties. The relative cold hardiness of the tea varieties studied did not change with age. When early and late varieties were grown in constant temperature rooms at 5°, 10°, 15°, 20° and 25° C. for periods of up to 40 days starting in January, the early varieties grew well at 10° C., whereas the late ones grew well only at 25° C. Less change in leaf moisture content and sap refractive index was induced by temperature change in the late more hardy varieties than in the early tender ones. Shoots from bushes showing poor growth, from shaded sites or which had been harvested 4 times the previous year, showed poor cold hardiness in artificial freezing tests. Late pruning of the tea bush in the autumn also tended to reduce hardiness. Unfrozen, water-deficient shoots developed drought injury at the distal ends; frozen shoots were more damaged than those supplied with water and showed freezing injury in the same regions as drought injury. When water-saturated shoots were frozen, injury occurred first in the region surrounding the vessels. Assam hybrid clones and black tea varieties bred at Kagoshima suffered severe damage to their foliage in strong cold winds in January. Their leaves dried up and had the appearance of drought injury. Examination of the injured plants showed them to have poor root systems. Freezing of the soil or freezing of the base of the stem were thought to have contributed to the severity of the damage.

6253. Pearce, S. C.
A recent study of the results of some Ceylon tea fertilizer trials.
Tea Quart., 1959, **30**: 93-5, bibl. 2.

Analysis of the results of 4 trials showed that in some areas N could profitably be supplied at slightly higher rates than is customary. The application of 10 lb. N per 100 lb. of made tea is suggested, together with 3 lb. of P_2O_5 and 4·7 lb. of K_2O per 100 lb. of crop.

6254. Mulder, D., and de Silva, R. L.
Deficiency diseases and the symptoms of magnesium deficiency.
Tea Quart., 1959, **30**: 157-65, bibl. 7, illus.

The relations between the symptoms of various nutrient deficiencies and climatic conditions are discussed. Clones susceptible and resistant to Mg deficiency are given. Spraying with 2% $MgSO_4$ solution markedly reduced Mg-deficiency chlorosis, but injection into the soil was ineffective. The reduction of chlorosis was less marked where the soil was infested with nematodes.

6255. Child, R., and Smith, A. N.
Manganese toxicity in *Grevillea robusta.*
Nature, 1960, **186**: 1067, bibl. 1.

Death of seedlings occurred when they were planted as tea shade trees on red, highly acid soils with a pH as low as 4·2. Examination of 2 specimens revealed Mn contents of 1940 and over 4,000 p.p.m., respectively.

6256. Smith, A. N.
Boron deficiency in *Grevillea robusta.*
Nature, 1960, **186**: 987, bibl. 2.
A deficiency disease of *Grevillea robusta* in Nandi Hills.
Tea, 1960, **1**(3): 27, 29, illus.

Reported from Kenya where *Grevillea* is used to shade tea, the symptoms included die-back, defoliation, bark cracking and gum exudation. The tea plants showed no symptoms.

6257. Mulder, D.
Review of thirty years study of tea diseases in Ceylon.
Tea Quart., 1959, **30**: 113-16.

Including a list of major achievements.

6258. Hutchinson, M. T.
Resistance and tolerance of tea to nematodes.
Tea Quart., 1960, **31**: 13-18, bibl. 20.

Of the 17 clones found by the Tea Research Institute of Ceylon to be resistant to, or tolerant of, *Pratylenchus coffeae*, 8 are of above average quality. Other nematodes are at present of little economic importance, but resistance to *Meloidogyne javanica* and *M. brevicaula* is being investigated.

6259. Visser, T.
Observations on the prevalence and control of parasitic eelworms in tea.
Tea Quart., 1959, **30**: 96-107, bibl. 28.

The incorporation of organic matter, in the form of loppings, compost and manure, assisted in reducing the nematode populations in the soils, and also indirectly lessened the effects of infestation by increasing the resistance of the plant and improving soil conditions. Many of the cover crops, green manures and shade trees associated with tea cultivation appeared to be more or less immune to the meadow nematode and not very susceptible to the root-knot nematode. *Tephrosia vogelii*, however, should not be planted, as it is very susceptible to both nematodes. The cultivation of marigolds, *Tagetes* spp., showed promise as an effective means of controlling nematodes in nurseries or in fallow tea soil. Soil fumigation in mature tea depressed nematode populations considerably, although for a limited time only, and its effect on yield was also favourable. Nemagon at 10 gal./acre, diluted to about 40 gal. with kerosene, was more suitable than DD or Nematox 100.

60. Visser, T.
Practical aspects of the eelworm problem in tea.
Tea Quart., 1959, **30**: 143-9, bibl. 11.

eadow nematode (*Pratylenchus coffeae*) should be adicated before tea is replanted by cropping the ea with Guatemala grass and marigolds. Young a in nurseries can be kept free from root-knot matode (*Meloidogyne javanica*) by soil fumigation fore planting or by using a mixture of peat, sub-il and sand. *Tephrosia vogelii* should never be ed as a shade, as it is susceptible to both species.

61. Cranham, J. E.
The mite pests of tea: a review.
Tea Quart., 1960, **31**: 5-11, bibl. 26.

e biology and control of mites from the families tranychidae, Tenuipalpidae, Tarsonemidae and iophyidae.

62. Judenko, E.
Further small-scale field experiments on the chemical control of attack by shot-hole borer (*Xyleborus fornicatus* Eich.) on tea in plucking.
Tea Quart., 1960, **31**: 19–25, bibl. 3.

in earlier experiments [see *H.A.*, 29: 4118] only lower parts of the bushes were sprayed, up to ft. depending on size. The minimum effective sage of dieldrin was 1·1 lb. in 100 gal. per acre on y days and 8 lb. in 100 gal./acre on wet days. lordane was less effective.

63. Calnaido, D.
Notes on the distribution and biology of the lygus bug, *Lygus viridanus* Motsch. (Heteroptera-Miridae), a pest of tea in Ceylon.
Tea Quart., 1959, **30**: 108-12, bibl. 3.

e estates subjected to attacks by this pest are ed, and its life history, the damage caused and st plants are described. Methods of control lude hard plucking and the application of 1 lb. DT 50% w.p./25 gal. at the rate of 100 gal. spray/ re. In good weather only 1 application is cessary, but if further symptoms appear a second plication may be made 2 weeks later. Removal wild plants, which are alternate hosts to the pest, also recommended.

64. Laycock, D. H.
A progress report on the first six years of a pruning experiment with Nyasaland tea.
Trop. Agriculture Trin., 1960, **37**: 125-34, bibl. 15.

sults are given for the first 6 years of a 3^3 factorial periment comparing 3 pruning cycles, 3 tipping ghts and 3 N rates. No significant differences total yields for the 6 years were caused by pruning cles or by tipping heights, but increasing N rates used significant increases. An interaction be- een length of pruning cycle and N rate is slowly increasing in importance and is indicating that longer cycles require higher N to support them to their optima. The main treatments have had various effects on the framework characteristics measured, but only N has consistently caused increases and these tended to fall off between the 2 higher rates. Of these characteristics, area and numbers of branches were found to be significantly and positively correlated with total crop. [From author's summary.]—Tea Res. Stat., Mlanje, Nyasaland.

6265. Macalpine, R. I., and Grice, W. J.
Pruning and tipping measures in practice.
Two and a Bud, 1960, 7(1): 22-7.

Current practices in the plains and in the Darjeeling area discussed.

6266. Dutta, S. K.
Experiments on pruning and tipping in relation to plucking and yield.
Two and a Bud, 1960, 7(1): 9-21.

Experiments in 4 districts are described. In one, now in its 10th year, the highest yields were obtained where the tea was skiffed to level the bushes off once in 3 years and pruned normally in the other 2; this was closely followed by pruning once in 3 years, with a deep skiff and a levelling off skiff in the other 2. The best quality tea, however, came from annually pruned bushes. Plucking 4 inches to janam [the so-called fish leaf] outyielded plucking 6 or 8 inches to janam in another trial, but the quality was lower.

6267. Barua, D. N.
Plucking in relation to pruning: some physiological principles.
Two and a Bud, 1960, 7(1): 3-8.

The author emphasises the essential complementary nature of pruning, tipping and plucking. Experiments show that the most suitable tipping height is the natural banjhi [dormant] height on the pruned bush.

6268. Harada, S., Masuda, K., and Anma, S.
Studies on the maturity of tea leaves. (Part 1.) On the relations between the plucking time and the growth and yield in four tea varieties.
[Japanese, with English summary 1 p.]
Kuwabara, Y., and Satô, T.
Idem. (Part 2.) The relations between the percentage of banjhi leaves, the character of leaves and qualities of tea. [English summary ½ p.]
Torii, H., and Ôta, I.
Idem. (Part 3.) The relations between the maturity of leaves, the qualities of tea and the chemical constituents of leaves. [English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1960, No. 7, pp. 91-109, 110-29, bibl. 4, and 130-42.

The first paper considers the development of the banjhi [dormant] condition over 3 seasons in 4 varieties. The quality of green tea deteriorated gradually as the leaves matured until 90% banjhi leaves was exceeded, when there was a sharp drop in quality. The longer and harder the leaves became, the lower was the quality. Nitrogenous fractions in the leaves fell with increasing maturity, particularly in the first season. Quality, but not liquor colour, was related to N content.

6269. HUTTON, A. F.
Notes on drum withering.
Tea Quart., 1959, **30**: 150-4,

Describes the construction and operation of the Sirocco Mark II withering drum, with comments by E. L. Keegel.

6270. RAMASWAMY, M. S.
Pectic substances in Ceylon tea.
Tea Quart., 1959, **30**: 86-92, bibl. 11.

The pectic substances are listed, and their chemical composition and the role they play during the manufacture of tea are described. Experimental results showed that: a partial breakdown of protopectin appeared to take place during withering; the methyl alcohol content of tea pectinic acid varied from 4 to 5%; pectinic acids broke down to pectic acid and methyl alcohol during fermentation, and the pectic acid formed impeded the oxidation of tea polyphenols and possibly the condensation of oxidized polyphenols; the quality and pectinic acid content of teas appeared to be related. The high quality of tea produced during dry weather is probably related to a high percentage of pectinic acid.

Sundry crops.

6271. FOX, H. C., AND MILLER, D. S.
Ackee toxin: a riboflavin antimetabolite?
Nature, 1960, **186**: 561-2, bibl. 10.

Evidence from nutritional studies indicates that the toxic nature of *Blighia sapida* fruit is due to its causing a deficiency of B vitamins.—Nat. Inst. med. Res., London.

6272. DATTA, R. M., AND MITRA, J. N.
Further observations on some abnormal leaves of *Aegle marmelos* Corr. (Family: Rutaceae).
Sci. and Cult., 1960, **25**: 645-6, bibl. 1, illus.

Abnormalities of lobation.

6273. ISLAM, A. S.
Unproductivity in the colchicine-induced tetraploids of *Annona squamosa* L.
Nature, 1960, **187**: 343-4, bibl. 2, illus.

Cytological studies on the tetraploids repor in *H.A.*, 23: 4718 and now found to be n bearing.

6274. GHOSH, S. S., AND PURKAYASTHA, S. K.
Characteristic arrangement of septate fibres the wood of *Averrhoa* sp.
Sci. and Cult., 1960, **25**: 690-1, bibl. illus.

6275. AHMED, S.
Barbados or West Indian cherry.
Punjab Fruit J., 1959, **22**(79): 15-16, bibl.

Description and culture.

6276. JAUHARI, O. S., AND MEHRA, R. C.
Propagating *Carissa carandas* (Karaund vegetatively.
Trop. Agriculturist, 1959, **115**: 29-35, bibl. illus.
JAUHARI, O. S.
A note on propagating *Carissa carandas* air-layering with the aid of growth regulato
Curr. Sci., 1960, **29**: 69, bibl. 1, illus.

Mixtures of growth substances at 2,500, 5,000 a 7,500 p.p.m. were applied to shoots 1·5 cm. diameter in the rainy season and in spring. In t rainy season all concentrations of IAA + IBA a the 2 higher rates of IBA + NAA promoted 100 rooting, the other combinations giving 70–80% In the spring the maximum rooting (30%) w obtained with the highest rate of IAA + IBA; 5,00 p.p.m. IBA + NAA gave 20% rooting and t rest 10% or less. There was no rooting in t controls in either season.—Govt. agric. Coll Kanpur.

6277. RANDHAWA, G. S., MALIK, R. S., AN SINGH, J. P.
Note on clonal propagation in the phal (*Grewia asiatica* L.)
Indian J. Hort., 1959, **16**: 119-20, bibl. 4, illu

Promising results from various budding method ground layering and inarching.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 4747, 4748, 5872, 5884, 5895, 6058.)

78. ALSTON, A. H. G.
The ferns and fern-allies of west tropical Africa.
Published on behalf of the Governments of Nigeria, Ghana, Sierra Leone and the Gambia by the Crown Agents for Oversea Governments and Administrations, London, 1959, 10 × 6½ in., pp. 89, bibl. 11, illus., 7s. 6d.

supplement to the second edition of the Flora e *H.A.*, 29: 972].

79. BLOOM, A., AND OTHERS.
Modern nursery practice.
Cable Press, London, 1959, 7 × 5 in., pp. 224, illus., 12s. 6d.

first acquaintance most deceptive; a dull page niniscent of a book of sermons but containing den opinions of men of vast experience and good ise, men who have come up the hard way and now ve much to tell us about the industry they have erited and modernized. Perhaps this has led to ne use of biblical phraseology; not unpleasing re in connection with things of the earth and generation and establishment. Certainly it ful- its title, for there are hundreds of concise descrip- ns of activities leading to a successful modern rsery, from the choice of site and planning, right ough all operations up to stock keeping and rketing. There are three main sections, but the re headings, Hardy perennials, Trees and shrubs, asshouse plants and crops, serve also to cover ner major divisions of the industry, such as bines, tree fruits, pot plants, bedders, cut flowers d bulbs. A surprising book indeed; the more e digs, the more one finds. Reading straight ough, a number of repetitions are noticed, but ten section by section this is of little consequence, ng bound to happen where there are nine hors; indeed it serves to give completeness to h division.

. Alan Bloom is responsible for the first sixty ges; if these were all, the book would still be well rth the money. He begins with "The first essen- s" and ends with "The sales side", and hammers me the importance of an alert mind and an serving eye; clearly Mr. Bloom is an informed and husiastic teacher, "How much, or how quickly e learns will depend not so much on what one is ght, but on how one uses every chance that comes one to acquire knowledge whilst on the job."

ery secondary school in the country should place opy or two of this book on its "careers" shelf, to read in conjunction with the appropriate choice careers pamphlet issued by the youth employ- nt executive. The school art class might well design a more appropriate dust cover, featuring, perhaps, an aspiring youth armed to the teeth with nursery tools.

R.J.G.

6280. CONFEDERAZIONE INTERNAZIONALE DEI TECNICI AGRICOLI.
[Proc.] World Congress of Agricultural Research, 7-9 May 1959, 1959, C.I.T.A., Rome, pp. 1459, illus.

Although one hesitates to dub this "*Parvum in multo*"—to spoil a good cliché—one is somewhat grateful that the English taxpayer did not have to foot the printing bill.

The book contains an account of the short proceedings and the papers presented at Rome on the occasion of a meeting of experts and others from most of the countries in Europe, including the U.S.S.R., with a sprinkling from South America, Africa, Malaya, Israel, the Lebanon and the U.S.A. Resolutions were passed urging the necessity for properly organized research into agriculture in general, and in particular into vegetable growing, viticulture, olive growing, soil problems, mechanization, nutrition, plant protection and various animal husbandry problems.

The papers are nearly all in the nature of review articles, and most have summaries in French, German, Italian, Spanish and English. Among subjects on which the casual reader will find some interesting dissertations are the following: (1) Layout of research organization in Germany, Belgium, Finland, France, Great Britain, Italy, Norway, and Holland. Viticultural research in Spain, Hungary and Italy. Olive research in Spain and Italy. Horticulture in general in Egypt, France, Germany and Romania. Fruit growing, tomato growing and tobacco growing in Italy. Tropical soil problems. Rubber problems in Malaya. Water consumption problems in vegetables (at Hanover). Fungicides, insecticides, acaricides, nematicides and trace element work—they are all there—and one just cannot help wondering why?

D.A.

6281. DEMARET, F., AND CASTAGNE, É.
Flore générale de Belgique: Bryophytes Vol. II, Fasc. I. **(A general flora of Belgium: Bryophytes Vol. II, No. I.)**
Minist. Agric., Jardin bot. État., Brux., 1959, 10 × 6½ in., pp. 111, illus.

For a general description of the series, see *H.A.*, 21: 2128. This number deals with mosses.

6282. EDGAR, A. T.
Manual of rubber planting (Malaya) 1960.
Incorporated Society of Planters, Kuala Lumpur, revised edition 1960, 10 × 7½ in., pp. 705, illus., £3 3s., or £2 12s. to I.S.P. members, plus postage.

Since 1937, when Edgar's manual was first published, until the present time this standard reference book has been an essential guide for the rubber planter. Since the war, however, knowledge has grown rapidly on all aspects of rubber planting. Mr. Edgar has therefore devoted the latter years of a very long and outstanding career in the service of rubber production to revising his manual. He has not been content with minor changes but has provided a new, much larger and even more comprehensive work of reference. The manual is divided into 21 sections, which deal systematically with land and soils, the rubber tree and its clones, propagation and planting, maintenance, pests and diseases, production, preparation and preservation. Together with the sections dealing directly with rubber are others of almost equal importance to the rubber estate manager on mechanization, transport, timber, buildings, surveying and so on; there are even sections on labour management and health. The book ends with a trade directory and an excellent subject index. This is not intended to be a scientific treatise—there are no bibliographies for instance, and it is not a direct guide to research—but there is much here for the scientist who requires information on the practical aspects of rubber production. For the planter, and indeed anyone connected with the work and problems of the rubber industry, this manual is quite essential.

The disparity of date between the title page (1958) and the cover (1960) points to Mr. Edgar's manifest intention to include all the very latest information and findings, and this has resulted in slightly delayed publication and to the inclusion of a special section of addenda. The reader, of course, gets the benefit of this.

Printing and production are excellent, and there is little to grumble at. Pictures are few and far between, and the book would have benefited from the inclusion of more good photographs, especially to help in identifications, e.g. of pests, and to illustrate estate practices. Also, although there is a list of books for an estate library, the usefulness of the manual would have been even greater had the author included subject bibliographies or at least a much fuller list for further reading. But these are minor matters, the book as a whole deserves nothing but praise.

G.E.T.

6283. Fox Wilson, G., and Becker, P.
Horticultural pests: detection and control.
Crosby Lockwood, London, 3rd revised edition, 1960, 9 × 6 in., pp. 240, bibl. 22, illus., 25s.

The third edition of this popular book has been published under a new title "Horticultural pests: detection and control" by Dr. P. Becker, Entomologist to the Royal Horticultural Society.

Although the book follows the same general pattern as the earlier editions, minor changes ha been made to bring it up-to-date, and five sho appendices have been added relating to the h water treatment of plants, the host plants of ee worm pests, the prevention of bird damage, th control of rats and mice, and useful garde formulae.

Dr. Becker rightly states that the revision of th book was necessary, primarily because of th considerable advances in the field of chemic control of horticultural pests. This has bee undertaken with meticulous care, and simp control measures are given for most agricultur and horticultural pests. The scientific names hav been brought into line with modern usage, and th popular names conform to those recently publishe by the Ministry of Agriculture in Technic Bulletin No. 6. The coloured plates and th additional half-tone photographs add very considerably to the value of the book and provide ready means of detecting the pests concerned.

It is impossible in a short review to refer to all th merits of the book, but it contains such a vast fun of information that it will prove invaluable to th amateur, the gardener and indeed the profession entomologist. The price, 25s., is very reasonab for a book of this calibre, and the demand for it wi undoubtedly be considerable.

A.M.M.

6284. Horsfall, J. G., and Dimond, A. E (Editors.)
Plant pathology: an advanced treatise. Vo I. The diseased plant. Vol. II. The path gen.
Academic Press, New York and Londo 1959 and 1960, 9½ × 6½ in., pp. 674 and 71 bibls numerous, illus., each volume $22 o £7 17s. 6d.

Both volumes contain 15 chapters, each written b an authority on a particular aspect of plan pathology. The first volume deals with the histor and scope of plant pathology, the effects of diseas on the plant, its reaction and the problems o therapy. The second volume includes chapters o the parasites and their behaviour and interaction with their environment, toxins, viruses, the physiology and chemistry of fungitoxicity and othe aspects of the subject.

Production and printing are excellent. Eac chapter has a lengthy and comprehensive bibliography, and each volume has author and subjec indexes. In short this is a scholarly and up-to-dat textbook of the highest order.

A third volume, entitled "The diseased populatio —epidemics and control", is to be published in th near future. Its price is not yet stated. There is special discount of 10% on orders for the complet set.

85. Kramer, P. J., and Kozlowski, T. T.
Physiology of trees.
McGraw-Hill Book Co., Inc., New York, Toronto, London, 1960, 9½ × 6½ in., pp. 642, bibl. pp. 66, illus., 97s.

here are 16 chapters in this book: a very brief and adequate introduction; a curiously arranged one n growth and structure; eight on the usual processes"—photosynthesis, translocation, salt ptake, etc.; a rather sketchy one on reproduction; ne on seeds and germination; and four, where the ook really comes into its own, on the ascent of sap, ternal factors and environmental factors affecting owth.

part from some gaps the bibliography is excellent nd extensive, with over 1,700 references up to and cluding 1958. One feels, however, that the book as been somewhat unevenly written round this bliography, rather than that the authors, both xperienced research workers, have acquired a articular view of *tree* physiology, which they wish project on the background of the literature.

ecause the subject of the title is so vast, it seems all e more imperative to stress the essentialities of hat Agnes Arber no doubt would have called ee-hood, but in spite of their prefatory remarks, is is seldom done. Had there been some such ackground "philosophy", the arrangement of the aterial would probably have been more logical, nd the reader carried along more smoothly; as is one admires the hard work the authors have ut into the book, the catholicity of their reading, nd the refreshing freedom from dogma, but ishes that they had "sorted it all out" a little more. his is probably the lazy reader's reaction, and rtainly there is a mine of information here for all delve in.

better subject index would have been helpful, specially since the book is more likely to be useful a reference work than as a text for reading. The lustrations are clear and to the point, though one r two could well have been omitted (e.g. 16.1), nd a straightforward numbering system for them nd the tables would have made it easier to locate em.

H.W.B.B.

286. Laidlaw, W. B. R.
Guide to British hardwoods.
Leonard Hill, London, 1960, 8½ × 5½ in., pp. 240, bibl. 27, illus., 30s.

ccording to the foreword "the prime object of this ook is to afford a means of ready and accurate entification of hardwood trees, for students, resters and others interested in the subject". Vith a few exceptions all the trees and shrubs native Britain have been included, and because of this ide coverage, combined with a sound scientific pproach, the book should certainly fill a gap in ritish botanical literature. A great deal of information, formerly widely scattered, has been compressed between its covers.

An introductory section covers general morphology, anatomy and physiology. Next come identification keys, one for winter twigs, one for summer characters and one for fruits. Under the heading of general field characters a 12-page table gives a concise, quickly recognizable impression of each species. Similarly a 6-page table records the seasonal history of the principal species. The greater part of the book, however, is devoted to descriptions and line drawings of the individual species, which are arranged according to families. Descriptions are concise but adequate, and the numerous illustrations are clear and in most cases show the twig, leaf, flower and fruit characters.

J.T.F.

6287. Prockter, N. J.
Garden hedges.
Collingridge, London and Transatlantic Arts, Inc., Florida, 1960, 8½ × 5½ in., pp. 144, illus., 25s.

A first impression is that there must be few woody-stemmed plants which cannot be lined up and converted into hedges. In this book, excluding conifers, which get a chapter to themselves, some 360 species and varieties are alphabetically listed and described, often with very full instructions for cultivation and maintenance. Sizes range from *Erica carnea* at 1 ft. to Lombardy poplar at a hundred. Evidently there are hedges and hedges. No less than 15 selective lists of hedge plants for all types of soils, positions and purposes are provided. Even fragrant hedges are not forgotten, 18 species being suggested, though in all but four the fragrance is in the flower and not the foliage. An omission here is *Helichrysum angustifolium*. From its grey foliage emanates a powerful and, to addicts, appetizing smell of curry powder. No doubt the author knew what he was doing for he misses little. He may not like curry.

Chapters on uses, cultivation, maintenance, pests and diseases and finally, and by no means the least interesting, on the law relating to trees and shrubs, provide proof of the thoroughness which has gone to the making of this book.

It is not unpleasing to note that in this parade of all that is brightest and best in the hedging world, those two sturdy plebeians, the laurel and the privet, symbols to many of a stuffy Victoran past, here find their many virtues given full credit.

G.St.C.F.

6288. Robyns, W.
Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. Vol. IX. **(Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. Volume IX.)**
Institut national pour l'Étude agronomique du Congo belge, Brussels, 1960, 10 × 6½ in., pp. 597.

This volume covers 13 families from Buxaceae to Leeaceae. [Vol. VIII, Euphorbiaceae, has not yet appeared. For Vol. VII, see *H.A.*, 28: 4200u, and for a key to the families, *H.A.*, 29: 2018 k.]

6289. SEIDENFADEN, G., AND SMITINAND, T.
The orchids of Thailand: a preliminary list. Parts I and II, 1.
The Siam Society, Bangkok, 1959, 9½ × 7 in., pp. 101 and 186 + plates, illus.

Thailand, the new official name for Siam, lies wholly within the tropics and its long southern extension down the Malay Peninsula brings it close to the equator. The tropical conditions and a varied topography have favoured the development of a rich orchid flora and the authors of the present "list" say this records 750 species and add that "this is only a fraction of what may be found, or may even be already located in foreign herbaria." The authors are very modest in the claims they make for their account. The parts published (how many more are to follow is not stated) give names, references, ranges, and often first-hand field or garden and descriptive notes. Many of the species are illustrated by black and white drawings, generally with dissections, made from living specimens or pickled material collected by the authors. There are keys to the species for many of the genera, though, rather strangely, not for all. At the end of each of the two "parts" now published are some excellent coloured photographs of some of the orchids recorded.

This publication should be of considerable use to all workers on the flora of south-eastern Asia and should stimulate interest in the orchids of Thailand, both for residents in that country and for those who cultivate tropical orchids in many other parts of the world. The Siam Society is to be congratulated on publishing this work, for its general format is excellent and a credit to the printers.

W.B.T.

6290. WILLIAMS, H. T. (EDITOR).
Principles for British agricultural policy.
Oxford University Press, London, 1960, 9 × 6 in., pp. 317, 18s.

This study sponsored by the Nuffield Foundation has for various reasons lingered on the way, and twelve years have elapsed since a start was made in collecting information and compiling the discussion records of its eminent committee. It now makes most interesting but desperately non-committal reading. If it can be said to come down on one side of the hedge more than on the other, it is on the side of mixed farming. In such farming it is even suggested that common vegetable growing on a large scale might be a desirable feature. British grown fruit is dismissed in a few lines as not being a nutritional essential to the national food sup as long as imports are available, though it grudgingly admitted that "from the purely farmi point of view, in suitable districts the production fruits for dessert or for canning and preservati can be an appropriate concomitant of mix farming." We do not think this book will gra the shelves of many horticulturists.

D.A.

6291. WILSON, F.
A review of the biological control of insec and weeds in Australia and Australian Ne Guinea.
Tech. Commun. Commonw. Inst. biol. Con trol, Ottawa, **1**, 1960, pp. 102, bibl. 55 25s.

This comprehensive and painstaking review dea first with some 55 insect pests, including those fruit and plantation crops, garden and field crop forest trees and farm animals. The succeedin section discusses the biological control of 10 wee species. In all cases the various introductions predators and parasites are described and th results assessed. The review concludes with discussion of various aspects of biological contro This is the first of a projected series of simila reviews for various parts of the Commonwealth It compresses an immense quantity of valuabl information into a well digested and accessibl form, and thus provides an essential reference fo all persons concerned in any way with the problem and possibilities of biological control.

6292. YAPP, W. B. (EDITOR).
The effects of pollution on living material.
Symposia of the Institute of Biology, No. 8 1959, 8½ × 5½ in., pp. xii + 154, bibls, 25s

The 14 papers contributed to this symposium include only two of direct interest to horticulturists J. K. A. Bleasdale (pp. 81–7, bibl. 14) discusses the effects of atmospheric pollution on light intensity and soil fertility as well as the direct effects of gaseous pollutants on plant growth. He also mentions the protective effect of certain fungicidal chemicals against smog damage in Los Angeles. The uptake of radioactive fission products by plants is discussed by H. J. M. Bowen (pp. 113–23, bibl. 34). Although it is estimated that the radioactive fall-out during the next 50 years will increase the background radiation by only 0·7%, the ability of some plants to accumulate relatively large amounts of certain radio-isotopes by absorption through their foliage or roots is a disquieting feature. In particular, the so-called "accumulator plants", which may concentrate extraordinary quantities of specific elements in fall-out, deserve more attention than has been given to them hitherto.

Annuals and reports.

e also 4819, 4820, 5237, 5762, 5896, 5897, 5942,
6111, 6149, 6194, 6201-6203.)

93. ALKMAAR.

5e Jaarverslag 1959, Proefstation voor de Groenteteelt in de Volle Grond in Nederland. **(Fifth Annual Report of the Experiment Station for Vegetable Growing in the Open in the Netherlands.)**, 1960, pp. 103, illus., fl. 2.

ils and manures: The effects of organic manures
d peat on soils and crops. *Breeding:* Of aspara-
s, beans, peas, chicory. *Cultural trials:* Pre-
king and direct sowing of gherkin seed. Soil
bilization in asparagus fields. Length of harvest
son for asparagus. Cauliflower varieties and
thods of raising seedlings. Celeriac spacing.
ethods of raising beetroot seedlings. Leek
acing, planting and sowing. Shallot storage.
getable crop rotations. Bean seed vernaliza-
n and time of sowing. Chicory forcing, soil
pes, root harvesting and sowing dates. *Variety*
als: With strawberries, cauliflowers, gherkins,
ans, celeriac, beetroot, lettuces, leeks, rhubarb,
inach and chicory. *Pests and diseases:* White
bbage banding, lettuce mosaic, carrot virus
sease, asparagus foot rot (*Fusarium* sp.), dry rot
d canker (both caused by *Phoma lingam*) of
bbage, *Phytophthora porri* on leeks, simultaneous
ntrol of *Chortophila brassicae* and *Brevicoryne*
assicae on cabbage, chicory fly (*Napomyza*
teralis) on chicory and carrots, soil disinfection
r vegetable crops. *Weed control:* In many
getable crops.

94. BANGA, O., AND OTHERS.

Cultural value of varieties and breeding material, and its evaluation. Lists of new introductions.

[*Publ.*] *Inst. hort. Plant Breed., Wageningen, Holland*, 1959, pp. 92.

his comprises a record of the meeting of the
ternational Contact Group for Horticultural
ant Breeding held at Nice in 1958 under the
spices of the XVth International Horticultural
ongress. Reports were presented from Belgium,
ance, Germany, Great Britain, the Netherlands,
ew Zealand, Norway, South Africa and Sweden,
d lists of new introductions were included for all
the above countries except Belgium.

95. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM. (SCHUPHAN, W.)

Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse (BAQ), Geisenheim, Rheingau, Tätigkeitsbericht 1959/60. **(Annual Report of the Federal Institute for Quality Research in Plant Products, Geisenheim, for 1959/60)**, 1960, pp. 28, bibl. 21, illus.

esearch work included studies on the following
oblems: *Localization of essential amino acids in plants:* In cauliflower the biological value of protein increased from the stem to the laterals of the first, second and third order and to the undeveloped flowers. *The composition of spinach:* Tabulated data are presented on many constituents of spinach, including essential amino acids, with records of mean values and fluctuations. *The effect of treating food plants with insecticides:* After treatment with aldrin carrots showed residues of up to 1·5 p.p.m. in the outer layers of the root. *Histological-chemical studies of carrots:* Aldrin and dieldrin were found to be soluble in the ethereal oil of carrots, and differences in insecticide residues between carrot varieties are thought to be due to differences in the quantity and nature of this oil. Some *effects of weather on plant composition* were confirmed for peas, carrots, beetroot and spinach. Data are presented on the composition of beetroot in 1958 and 1959. *The relations between manuring and valuable constituents:* Spinach and lamb's lettuce (*Valerianella olitoria*) grown in a climate chamber responded to increased N applications with a decrease in the essential amino acid index. An increase in light intensity was associated with an increase in the biological protein value and with a slight reduction in total N. Increased P applications (up to 240 kg. P_2O_5 per ha.) resulted in a marked increase in P contents as well as in considerable increases in yields of spinach and lettuce. Further effects of P manuring on lettuce included better development of the head, an increase in total sugars by about 35% and trebling of the ascorbic acid content. In experiments with K the salt used had little effect on the composition of apples, but with horse-radish potassium sulphate produced higher values for dry matter, mustard oil and total sugars than did another compound containing 40% potash. *The biological value of green and ripe peas:* Seed size may be regarded as an index of maturity; dry matter content increased with size. On a dry matter basis the crude protein content decreased with size, but the relative protein content (protein N in total N) increased with size. Similarly, the biological value of the protein calculated for 10 essential amino acids increased with size. *Storage of vegetables:* The effect of storage on the composition of spinach is illustrated graphically. *The carotene content of carrots* increased with higher yields, big roots being richer in carotene than thin ones. *The oxalic acid content of spinach* was higher in the spring than in the autumn. Ca nutrition and the form of N application also affected the oxalic acid content.

6296. CANADA DEPARTMENT OF AGRICULTURE. (RIPLEY, P. O.)

Progress Report of the Field Husbandry, Soils and Agricultural Engineering Division for 1954-1958, 1960, pp. 41.

Agricultural engineering: Of various methods of greenhouse cooling studied, painting the glass and shading were effective, but shading resulted in weak growth. Fan-cooling and refrigeration were also effective and did not weaken the plants. Evaporative cooling required forced ventilation to remove the moisture produced. *Agro-meteorology:* Beet, pumpkin and spinach were among the test crops used in an 8-station study of climatic influences on cropping. *Field husbandry:* The herbicides 2, 4-DB and MCPB were found to be satisfactory weed killers in legumes at rates of up to 24 oz. per acre.

6297. Cawthron Institute.
Annual Report of the Cawthron Institute, 1958-59, Nelson, N.Z., 1959, pp. 46.

Hops: Sulphate of ammonia and nitrate of soda gave larger increases in yield over non-fertilized controls than organic forms of N. *Tobacco:* The effects of N source, spacing, minor elements, irrigation and variety on protein, total sugar and reducing sugar contents were investigated. *Tomatoes:* Chloropicrin treatment, which is now only half the cost of steam sterilization, has given good control of soil-borne diseases for 12 seasons. The application of small quantities of fertilizer (6 oz./sq. yd.) and large volumes of water induced blotchy ripening of Potentate. Articles on tomato nutrition and flower production are abstracted separately. Work on bitter pit of apples, summarized in a short article on pp. 25-6, has been described in detail elsewhere [see abstract 4978.]

6298. Centrum voor Plantenfysiologisch Onderzoek, Wageningen.
Jaarverslag 1959, Centrum voor Plantenfysiologisch Onderzoek, Wageningen. **(Annual Report of the Centre for Plant-physiological Studies, Wageningen, for 1959)**, 1960, pp. 13.

The following projects are reported on: Plant damage caused by the uptake of plant protective chemicals (estimation of phytotoxicity by degree of bleeding; leaf absorption of insecticides). Interactions between shoot, root and fruit growth (transport of assimilates through the graft union in melons.) The direct beneficial effect of spray materials on plants (the effect of triphenyl tin acetate on the yield and metabolism of celeriac). The physiology of witloof chicory (storage of roots; bolting). The metabolism and transport of absorbed N compounds in tomatoes.

6299. Colonial Pesticides Research Committee.
Twelfth Annual Report (1958-1959), 1959, pp. 261-80.

Research briefly reviewed includes work on the control of *Pseudotheraptus wayi* on coconuts, the coffee berry moth (*Thliptoceras octoguttalis*), cacao black pod (*Phytophthora palmivora*), herbaceous weeds in coffee and pyrethrum, and the residual properties of insecticides. Other work reported, though not under the aegis of the Committe includes control of the Mediterranean fruit (*Ceratitis capitata*), loquat scab (*Spilocaea eriob tryae*), and the *Oryctes rhinoceros* beetle.

6300. Colonial Products Council.
Sixth Annual Report (1958-1959), 1959, p 281-311.

Examples of enquiries dealt with at the Tropic Products Institute are given. Investigations carrie out at the Institute and briefly reported inclu work on jasmine pomade, cinnamon oils, blac pepper, palm oil, lemon juice, pyrethrum an derris. Investigations in progress elsewhere und the aegis of the Council and here reported inclu cacao diseases and the constituents of tea leaves.

6301. Committee for Colonial Agricultural Animal Health and Forestry Research
Fourteenth Annual Report (1958-1959), 195 pp. 17-192.

Research projects noted in this extensive report ar grouped under three headings. First, unde Regional Research, the activities of the variou territorial research stations are recorded, includin work on sugar cane, cacao, oil palms and banana Secondly, research projects undertaken with assis tance from Colonial Development and Welfar funds are noted, including work on coconuts an pepper. Thirdly, the research undertaken by th various colonial departments is reviewed. Thi section comprises more than half of the report, an the crops dealt with include sugar cane, coconuts vines, nutmegs, cacao, coffee, deciduous stone fruits bananas, tomatoes, pineapples, rubber, tobacco citrus and tea.

6302. Commonwealth Economic Committee.
Fruit—a review of production and trad relating to fresh, canned and dried fruit, frui juices and wine.
Publ. Commonw. econ. Cttee, 1960, pp. 203 10s.

Production, consumption, imports, exports an trade tariffs of the major fruit producing areas o the world.

6303. Cornell.
Seventy-second Annual Report of the New York State College of Agriculture at Cornell University and the Cornell University Agricultural Experiment Station, 1958-1959, 1960 pp. 165.

Extension work, lists of research projects and published papers.

6304. Deutscher Wetterdienst.
Jahresberichte des Deutschen Wetterdienstes Nr. 7. Jahresbericht 1959. **(7th Annual Report of the German Meteorological Service for 1959)**, Offenbach a.M., 1960, pp. 76, illus.

Includes a section on agricultural meteorology pp. 46-51), including various activities concerned ith horticultural crops.

305. GEORGIA.
Serving Georgia through research, being ***Annual Report of the University of Georgia College of Agriculture Experiment Stations for 1958,*** pp. 34.

ists of projects and personnel.

306. GHANA.
Annual Report of the Department of Agriculture for the year 1956-57, 1959, pp. 84, illus., 11s. 6d.

eneral Agriculture: Coffee seed could be stored afely in a desiccator for up to 10 weeks after slow rying in the shade. With oil palm seeds allowing he temperature in the germinator to fall to the tmospheric temperature for 24 hours every 14 days ave improved germination. *Cocoa:* Spraying ith 0·3% Perenox increased yields 35–55%, lthough the percentage of black pods fell by only 0%; the standard capsid control treatment consists f 2 sprays of Gammalin 20 (1 pt./5 gal./acre) with 4-week interval, and later localized sprays as equired.

307. HONG KONG.
Annual Departmental Report by the Director of Agriculture, Fisheries and Forestry for the financial year 1958-59, 1959, pp. 97, illus., $(H.K.)4.

dministrative report.

308. ILLINOIS. (HOWARD, L. B.).
Research Progress at the Illinois Agricultural Experiment Station. Report for 1956-1958, Urbana, 1959, pp. 139.

nvestigations briefly reported include the followng: *Horticulture:* Tomato quality and nutrition tudies; strawberry irrigation; apple and peach rchard surveys and chemical thinning studies; a ew ornamental flowering crab apple named rairie Rose; apple maturity standards; effects of hotoperiod on rooting evergreen cuttings; chrysannemum breeding. Abstracts of theses summarize ork on tomato composition and ripening and trawberry composition. *Plant pathology:* Asparaus rust control with zineb; a new antibiotic ancomycin for bacterial spot of peach; apple scab ontrol with Cyprex; alternate hosts of onion bulb ematode; studies with predacious nematodes.

309. IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.
Report of the Governing Body and the Principal's Report for 1958-59, 1960, St. Augustine, Trinidad, and 40 Norfolk St., London, W.C.2, pp. 68,

ncluding brief reports on cacao and banana esearch at the Regional Research Centre.

6310. INDIAN AGRICULTURAL RESEARCH INSTITUTE.
Scientific Reports of the Indian Agricultural Research Institute for the year ending 30th June 1956, 1958, pp. 142 + xxiv, 16s.

Agronomy: Tomatoes gave 16% more fruit with 90 lb. N and 60 lb. P_2O_5 per acre than with 10 tons of FYM. P produced an appreciable increase in cauliflower yield, but Mo had little effect. The optimum fertilizer treatment for hookah tobacco appeared to be 40 lb. N + 80 lb. P_2O_5 per acre. Post-emergence spraying with 2, 4-D suppressed weed growth in peas, whereas pre-emergence application of TCA was ineffective. *Entomology:* Control of mustard aphis was obtained with 4 sprayings of BHC or Pestox III. *Mycology and plant pathology:* The sugar cane variety S.G. 227/9 was found to be resistant to red rot and 74 other varieties were moderately resistant; 40 varieties proved resistant to smut.

6311. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
Annual Report of the Indian Council of Agricultural Research for 1955-56, 1959, pp. 196, Rs. 5 or 8s.

Agricultural Research: Entomology: Various formulations of DDT, BHC, chlordane and toxaphene in kerosene successfully controlled termites on trunks of mango and other fruit trees. *Vegetables:* Spacing onions 6 × 6 in. gave the best bulbs for marketing; Harvasan was the most suitable fungicide for treating pea seeds against wilt. *Horticulture:* Results of citrus rootstock and fertilizer trials are described; with bananas 4 lb., 3 lb. and 2 lb. portions of rhizomes grew significantly better than 2 lb. whole rhizomes; sprays of 2, 4, 5-T and NAA gave very poor sets of seedless grapes. *Spices and miscellaneous crops:* In the Madras pepper research scheme September-formed spikes produced predominantly female flowers, and polu (hollow-berry) was more prevalent in the Travancore varieties than in the Malabar varieties; with ginger planting time and spacing were investigated; turmeric yielded better when mother rhizomes were closely planted; with chillies P and K did not increase yields in the absence of N, and 60 lb. N instead of 40 lb. N/acre increased yields only in the presence of P and K.

6312. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
Annual Report of the Indian Council of Agricultural Research for 1956-57, 1959, pp. 209 + vi, 8s. 3d.

Though mainly concerned with cereals and animal husbandry the report also records considerable work on horticultural crops. *Phenology:* The average date of flowering in mango was found to vary from 1 December in the extreme south to 15 March in the north-west, or about 3·6 days per degree of latitude. *Vegetables:* DDT, dieldrin and Folidol were effective against shoot and fruit borer

(*Leucinodes orbonalis*) of eggplant. Some promising strains of okra showing high resistance to virus disease were isolated at Poona. Crosses were obtained between selected tomato varieties and the wild *L. pimpinellifolium* and *L. peruvianum*. Levels of 80 lb. N and 40 lb. P_2O_5 per acre gave the best results in fertilizer trials on tomatoes. Successful variety trials were conducted with the above crops and with brassicas, peas, beans, onions, gourds and other vegetables. *Fruits:* The earliest mango proved to be Sufeda and the highest yielder Goa-Bunder. The best rootstock for sweet oranges was Jamberi, and for lemons acid-lime. Whole rhizomes were found to be better banana planting material than pieces of equivalent size, and irrigation was found to be essential for heavy cropping in West Bengal. A satisfactory technique for propagating cashew nuts by air-layering has been worked out. Breeding and selection work on guavas, vines, custard apples, papaws, jujubes, date palms, apples, pomegranates, chestnuts, plums and peaches is recorded. Fungicidal wax dips proved successful in reducing losses of various fruits during transport and storage.

6313. JAMAICA.
Annual Report of the Ministry of Agriculture and Lands for the year ended 31st December, 1957, 1959, pp. 79, 4s.

Breeding and propagation work on tropical crops, including bananas, cacao, coffee, citrus, coconuts, pineapples and tobacco is reported, and investigations on the diseases and pests of these crops are described.

6314. KENYA.
Department of Agriculture Annual Report 1958, Volume II—Record of Investigations. 1960, pp. 167, sh. 7/50.

This volume provides a fuller account of research work briefly described in Vol. I [see *H.A.*, 30: 1465]. *Entomology:* Dieldrin proved to be 5 times as toxic to the coconut bug (*Pseudotheraptus wayi*) as DDT. Regular weekly spraying gave adequate control of mirid and pentatomid bugs on castor-beans. Two applications of DDT or dieldrin, which were found successful against pyrethrum thrips, were followed by a heavy infestation of *Tetranychus ludeni*, whose predators had been eliminated. Cultural and chemical methods gave striking results in the control of banana weevil (*Cosmopolites sordidus*). *Plant pathology:* Among the outbreaks of plant diseases recorded are a number on fruit and vegetable crops. *Soil chemistry:* The residual effects of fertilizers applied to potatoes or maize on the subsequent bean crops were greater in the bracken zone than in the kikuyu or star grass zones. *Coffee Research Station:* Mg fertilization increased the K content of the leaves and the ripe cherries, especially where a complete inter-row mulch was applied. Aerial spraying of malathion was successful against antestia bugs, and spot spraying of the suckers with diazinon gave reasonably good control of mealybug (*Planococcus kenyae*). Cu sprays to reduce leaf fall gave significant increases in yield, this increase being roughly proportional to the amount of Cu applied. *Horticulture:* Large or mixed size suckers proved the most successful planting material for pineapples. Although Dowpon did not eliminate couch grass from pineapple plantations, repeated applications at 6-month intervals suppressed it sufficiently to prevent competition. Suitable planting dates for melons and cucumbers were found to be the end of July and mid-May, respectively. The highest yields in a tomato trial were obtained from German Strain No. 10, Amateur and Hundredfold, but the first named had little market appeal. Zineb was the most effective fungicide for the control of tomato blight. Sulphate of ammonia at 2 cwt. per acre gave a 16% increase in tomato yields, whereas P, gypsum and a trace element mixture had no effect.

6315. KESTEREN.
Verslagen van de Stichting "Boom en Vrucht" te Kesteren over de jaren 1957 en 1958 en het Rijkstuinbouwconsulentschap Kesteren over de jaren 1957-1958. **(Reports of the "Tree and Fruit" Institute and the State Horticultural Advisory Service at Kesteren for the years 1957 and 1958),** [1960], pp. 108, illus.

The apple interstocks Dubbele Zoete Aagt and Dubbele Bellefleur were the most resistant to collar rot caused by *Phytophthora cactorum* and *P. syringae*; yields were poor on D. Zoete Aagt but excellent on D. Bellefleur. Of several forms of training compared for Cox, the free spindle bush gave the highest yield per tree. In a rootstock trial on heavy soil Golden Delicious produced higher yields per ha. on M.IX than on M.IV, whereas Jonathan did better on M.IV. Progress is reported in pear interstock trials, apple manuring and pruning trials, soil management in grass orchards and a study of the light intensity in apple orchards at different spacings. Heating frames for strawberry production increased earliness by 10–11 days but did not prove economic. Supplementary illumination considerably increased the earliness of strawberries in a heated house [see *H.A.*, 30: 309].

6316. MACHLIS, L., AND BRIGGS, W. R. (EDITORS).
Annual review of plant physiology, Vol. 11. Annual Reviews, Inc., Palo Alto, Calif., 1960, 9 × 6 in., pp. 468, bibls., $7.00 U.S.A., $7.50 elsewhere.

Review articles of horticultural interest include: Nitrogen fixation, by C. S. Yocum; The primary processes of photosynthesis in plants, by A. A. Krasnovsky; Heat transfer between the plant and the environment, by K. Raschke; The relationship between salt uptake and the absorption of water by intact plants, by R. S. Russell and D. A. Barber; Vernalization and its relations to dormancy, by P. Chouard; The mechanism of action of auxin, by A. W. Galston and W. K. Purves; Gibberellins as native plant growth regulators, by B. O. Phinney and C. A. West; Some aspects of the structure and behaviour of tobacco mosaic virus, by A. Siegel and S. G. Wildman; and Pectic and cellulolytic enzymes in plant disease, by R. K. S. Wood.

6317. MINISTRY OF AGRICULTURE, NATIONAL AGRICULTURAL SERVICE, WEST MIDLAND REGION.
Report on Field Experiments and Observation Studies in Horticulture 1957/1958. Counties of Cheshire, Herefordshire, Shropshire, Staffordshire, Warwickshire and Worcestershire, [1960], pp. 9.

Topics briefly recorded, with conclusions, include: control of grass at the base of fruit trees, control of couch grass in blackcurrants and gooseberries and weed control in rose briars, all with herbicides; nitrogenous top dressing of summer cabbage. Observation studies and experiments still in progress are listed.

6318. MINNESOTA.
Sixty-fifth Annual Report of the Agricultural Experiment Station, University of Minnesota, July 1, 1957 to June 30, 1958, 1959, pp. 54.

The horticultural department has developed the Princess and Minnehaha varieties of chrysanthemum, the flowering crab Radiant, the Welcome gooseberry, the Centennial and Northland crab apples. Progress was made on the production of hybrid tomato varieties.

6319. MISSISSIPPI.
72nd Annual Report of the Mississippi Agricultural Experiment Station for the fiscal year ending June 30, 1959, pp. 101, illus.

Entomology: Combinations of parathion and Phosdrin following single applications of either toxaphene or endrin gave better control of the cabbage looper than when the latter insecticides were omitted; Trithion (2 lb. 25% w.p./100 gal.) was very effective against azalea bark scale. *Horticulture:* Chilling before 1 January was less effective in breaking the rest period of peaches than equivalent chilling between 1 January and 15 February; with geraniums unpinched cuttings 3 to a pot were equal or superior to pinched cuttings grown only 1 per pot. *Plant pathology and physiology:* Dipping or spraying tomato plants with whole, skimmed or powdered milk was 90–95% effective in preventing the spread of tobacco mosaic virus; Gibrel was effective in breaking dormancy of peach whips when introduced into the vascular system; Thylate gave better control of azalea petal-blight than nabam or zineb.

6320. NAALDWIJK.
Jaarverslag 1958, van het Proefstation voor de Groenten en Fruitteelt onder Glas te Naaldwijk. **(Annual Report of the Research Station for Vegetable and Fruit Growing under Glass, Naaldwijk, for 1958)**, pp. 145, illus. fl. 5.

Brief general articles which are also summarized in a 24-page English supplement, include: Soil analysis as a basis for top-dressing. Trickle irrigation of carnations. Automation of trickle irrigation [see also *H.A.*, 29: 71i]. Chlorosis of grafted cucumbers. Culture of nerines. Growing unstopped tomatoes. Soil blocks for lettuces. Melon growing in glasshouses. Day length requirements of winter lettuces. A promising fruit-setting hormone for tomatoes (N-m-tolylphthalamic acid). New plum varieties for glasshouse culture. Damage to tomatoes during picking and grading. Correcting chlorosis in glasshouse fruit crops. Cork root of tomato. Control of glasshouse red spider in relation to its life cycle. Installation of soil heating. The research reports cover the following subjects: *Water relations:* tensiometers for control of irrigation of tomatoes and cauliflowers; trickle irrigation of tomatoes, cauliflowers, cucumbers and carnations. *Soilless culture:* of cucumbers and tomatoes. *Manuring:* applications of fertilizers to lettuces, cauliflowers and tomatoes, and of organics to tomatoes. *Cultural trials:* flowers (storage of nerine bulbs; soil temperature responses, storage and pre-germination of freesias; forcing bulbous irises; winter-flowering snapdragons); tomatoes (grafting; growing on more than one stem); eggplants and capsicums (grafting); lettuces (ventilation of frames for autumn crops; soil blocks for cold house crops); melons and cucumbers (planting distances; grafting); chicory (harvesting the roots). *Physiological studies:* root development of scorzoneras, tomatoes and lettuces; uptake of radioactive P by tomatoes; spraying tomatoes and cucumbers with sugar and urea solutions; supplementary illumination for tomatoes; dark treatment of chrysanthemums; lettuce vernalization. *Fruit set and growth substance experiments:* a new vibrator for pollinating tomatoes; development of the first tomato truss; germination and storage of tomato pollen; flower formation in cucumbers; hormone sprays and short-day treatment for autumn cucumbers; pollination of glasshouse plums; responses of freesias to gibberellin. *Breeding and variety trials:* with fruits, vegetables and freesias. *Storage and packing:* of tomatoes, cucumbers and grapes. *Disease, pest and weed control:* in vegetables and freesias.

6321. NATIONAL AGRICULTURE ADVISORY SERVICE, WALES.
Experiments 1958, N.A.A.S., Trawscoed, Aberystwyth, 1959, pp. 140.

Objects, treatments and current results of numerous experiments in progress.

6322. Nigeria, Northern Region.
Annual Report of the Department of Agriculture of the Northern Region of Nigeria, 1955-56, 1959, pp. 161.

Sugar cane: Strains resistant to red rot are all of the hard type and are not popular with farmers. *Safflower:* Late planting, in October, was beneficial to seed production. *Mangoes:* The use of plastic budding tape and budding in May–June are recommended. *Tobacco:* Fertilizer trials are in progress.

6323. Nottingham University.
Report of the School of Agriculture, 1959, Sutton Bonington, 1960, pp. 91, bibls, illus.

The report includes an article entitled "The propagation of plants by leaf cuttings", by M. E. Marston.

6324. Ontario Agricultural College, Guelph.
83rd Annual Report of the Ontario Agricultural College and Experimental Farm 1958, being *Sess.* **28,** 1959, pp. 98.

Research and development activities noted include: *Crops:* Blossom end rot of staked tomatoes was greatly reduced by the application of 32 lb. Ca chelate/acre combined with irrigation; gibberellic acid applied to celery 3–4 weeks before intended harvest advanced the harvest date by 1 week without reducing yield; GA also increased the marketable yields of muskmelons by 39%; greenhouse chrysanthemums made relatively slow growth when grown in soil which had grown the same crop immediately before, but water, ethanol or acetic acid extracts from such soils did not reproduce the inhibition. *Diseases, insect and weed control:* Louise was the only one of 14 strawberry varieties to resist powdery mildew; Cyprex produced russeting only on Golden Delicious, when it was applied to 6 apple varieties just prior to a cold spell at blossom time. A list of research projects and publications is included.

6325. Scoresby Horticultural Research Station.
Review of activities for the year ended 30th June 1959.
Fruit World, Melbourne, 1960, **61**(1): 13-19.

Various aspects of stone and soft fruit culture are covered, including variety, rootstock and pruning trials and investigations on manuring and soil management. Fruit and vegetable ripening and fruit storage trials are also described.

6326. Stahl, C.
Beretning fra Statsfrøkontrollen for det 88. arbejdsår fra 1. juli 1958 til 30 juni 1959. **(Eighty-eighth Report of the Danish Seed Testing Station for the year 1st July, 1958, to 30 June, 1959.)** [English summary 2 pp.]
Tidsskr. Planteavl, 1960, **63**: 737-803.

Including results of tests on 3,840 samples horticultural seeds.

6327. Summerland.
Summary of Annual Reports, Summerlan B.C., for 1958, 1959, pp. 30 + 7.

Reports of extensive horticultural studies inclu the following: *Entomology:* Sevin 50% w.p. w effective against codling moth at 8 lb. per acre an against pear psylla at 12 lb. per acre. Europea red mite was controlled by Genite, Tedion or fenso 50% wettable powders at the pink bud stag Sodinoc at 2 lb. per 100 gal. and 10% lime-sulphu were effective against blister mite. Sevin 50% w. also controlled leaf roller, eye-spotted bud mot peach twig borer, lecanium scale and green app aphis. *Plant Pathology:* Both Greenz 26 an Sequestrene 330 rapidly removed symptoms of iro deficiency in apple and pear, and a zinc sulphat lime combination was the most effective agent f curing Zn deficiency. Almost complete suppre sion of apple scab ascospores was obtained by 1 ga in 75 gal. spray of phenylmercuric 8-oxyquinoli 28·5% in October. Brown rot of cherries w reduced to 1% incidence by sprays of captan an ferbam. Both zinc sprays and gibberellin improve fruit size and colour in trees affected by little cherr disease. *Pomology:* McIntosh apples stored be at 34° F. and in an atmosphere with a CO_2/O_2 rati of 5/3. Scald was controlled in Delicious an Stayman apples by an aqueous dip of 1000 p.p.m diphenylamine. Antonovka seedling rootstock proved highly frost resistant. *Vegetables:* Tran lucent polythene proved superior to opaque film a a tomato mulch. *Plant nutrition, soils and irrig tion:* Ammonium nitrate at 12 lb. per tree gave higher yield of apples than lower or no dressing but with less hardening in the autumn. Amin triazol was effective but non-persistent in contro ling weeds around young trees. Studies on bul handling apples, pears and peaches are reported.

6328. Tanganyika.
Annual Report of the Department of Agricu ture, 1958, Part I, 1959, pp. 41, 4s., ***Part (Research),*** 1959, pp. 33, 3s. 50 cts.
Record of Research Work carried out in 195 [1959], pp. 120 [cyclostyled].

Part I is an administrative report; Part II is shortened and more general version of the fu research report available this year in cyclostyle form. Much of the work described therein is of long term nature from which conclusions cann yet be drawn. *Pyrethrum:* The application of 20 lb. per acre of Dutch mixture (30% P_2O_5 and 6–7 N) significantly increased the yield of dried flower especially when combined with a 150 lb. per acr dressing of P_2O_5, the latter alone being less effecti than the Dutch mixture by itself. Cutting bac the pyrethrum plants reduced yields by about 10 lb. per acre. *Sugar cane:* Chemical control of th red cane beetle (*Cochliotis melolonthoides*) has been obtained with aldrin placed in the furrow, although the degree of control in the ratoon crop was inadequate. *Tobacco:* All combinations of NPK fertilizers increased yields, the most effective being 45 lb. N, 84 lb. K_2O and 40 lb. P_2O_5 per acre. Outbreaks of anthracnose (*Colletotrichum tabacum*) were controlled with zineb. *Castor beans:* January proved to be the best sowing time for castor beans, the giant variety yielding better than the dwarf; on these January sowings insecticidal dusts increased yields by 30–180%. *Coffee:* The growth of seedlings of both robusta and arabica coffee was reduced by interplanting bananas, the reduction being roughly proportional to the density of the banana population. In a large fertilizer experiment the coffee trees least affected by leaf speckling and yellowing in September were those on the N plots, followed by those given K, whereas the addition of P tended to aggravate the symptoms. Weed germination with the onset of the rains was greatest on the P plots.

6329. VIRGINIA.
Research Report of the Virginia Agricultural Experiment Station for the period July 1, 1957, to June 30, 1959, 1960, pp. 290, illus.

Field crops: This section includes progress reports on the breeding and testing of new varieties of flue-cured, fire-cured and sun-cured tobacco, with details of their resistance to black-shank disease, wildfire, black root rot and root knot. Anthracnose appeared in Virginia in 1958 for the first time. In addition to chemical control measures against many tobacco pests the control of hornworms by *Bacillus thuringiensis* is noted. *Fruits, vegetables and ornamentals:* N-M-tolylphthalamic acid (Duraset) and adenine sulphate had no effect on fruit set of Red Delicious apples. Resistance of insects to DDT, DDD and phosphorous insecticides is reported. The storage life of apples may be predicted by measuring their firmness at harvest time. The new peach varieties Washington and Jefferson were shown to be frost-escaping and frost-hardy, respectively. Chemical thinning of apples by NAA plus Tween 20 was increased by additions of guanidinium chloride and certain formulations of Guthion, malathion or parathion. Irrigation and close planting have consistently increased yields of broccoli. The unsuitability of chewing fescue, creeping red fescue, ryegrass and Merion bluegrass for lawns in Virginia was demonstrated.

6330. WEST OF SCOTLAND AGRICULTURAL COLLEGE.
Report on the Work of the College for the year ended 30th September 1959, 1959, pp. 92.

Horticultural work briefly recorded includes tomato management and breeding for resistance to leaf mould; vegetable, fruit and chrysanthemum variety trials; trials with different types of plant pots and herbicides.

6331. WISCONSIN.
What's new in farm science? being ***Part 2, 75th A.R. Wis. agric. Exp. Stat.*** or *Bull.* **538,** 1959, pp. 105, illus.

Tobacco: Direct field seeding under plastic strips is being tested. *Special subjects:* Several fungicides showed promise against rose powdery mildew; fungicidal treatment of soil or bulbs gave protection against Easter lily root rots; control of cyclamen stunt disease was studied. *Fruit:* New apple varieties; apple pest control studies; storage of young cherry trees in moist sawdust; cherry virus disease studies; deep irrigation of strawberries; weed control in strawberries and cranberries. *Vegetables:* Absorption of soil insecticides by vegetables; fertilizer studies; varietal tests with broccoli, radishes, tomatoes and beets; pest and disease control in peas, lettuces and cabbages.

6332. ZANZIBAR.
Annual Report of the Department of Agriculture, 1958, 1959, pp. 48, 2s.
Supplement to the Annual Report of the Department of Agriculture, 1958. Results of Field Experiments, Crop and Stock Records and other Statistics, 1960, pp. 19, 2s.

Investigational work in progress is mentioned briefly in the Annual Report. The Supplement contains the results of current experiments, including the following: *Pineapples:* Mulching 5 in. deep with coir fibre dust produced a greater number of considerably larger fruits over the plant and 2 ratoon crops compared with the control. *Derris:* In a spacing and time-of-harvesting trial planting 2 ft. apart, on ridges 5 ft. apart, and harvesting as soon as convenient after 18 months gave the best results. *Coffee:* Liberica coffee responded to mulching for the 4th successive year, mulched plots producing 4 times the yield of the control. There were no significant responses to N, P or K. *Cloves:* In an unreplicated trial applications of NAA in December and January caused yield increases when the crop was harvested the following December. *Limes:* Budded plants outyielded seedlings, but there was no response to fertilizers.

HORTICULTURAL ABSTRACTS

ERRATA Vols. XXVI-XXX

Volume XXVI

Abstract

330 Title, Line 4 and Text, Line 1. *For* cherry *read* plum

537 Text, Line 8. For *Chryptotaenia* read *Cryptotaenia*

732o Title, Line 4. *For* **28** *read* **28**(6)

753 Text, Line 13. *After* experiment *insert* but with cigar tobacco

854 Text, Line 7. For *Lupinus albus* read *Lupinus termis*

1219 Title, Lines 3 and 4. *For* seed cuttings *read* seed and cuttings

1240 Title, Line 3. *For* Vintage Press *read* Vantage Press

1612 Title, Line 6. *For* **21** *read* **65**

2844 Title, Line 4. For *Canad. J. Agric.* read *Canad. J. agric. Sci.*

3091 Text, Lines 3 and 4. For *Phyllocoptruta oleivora* read *Lepidosaphes beckii*

3501 Title, Line 2. *For* of analogues *read* by analogues

3597z Author. *For* Ministerie van Landbouw, The Hague *read* Plantenziektenkundige Dienst, Wageningen

4065 Text, Line 1. *For* repressions *read* regressions

4118 2nd Author. *For* Chryssoheris, F. P. *read* Chrysocheris, F. P.

Volume XXVII

805 1st Author. *For* Orihuel, G. *read* Orihuel Gasque, B.

978 Text, Line 51. *For* Larson *read* Larsen

979 Title, Line 4. *For* Collingwood *read* Country Life

1233 Text, Lines 12 and 13. *For* 2g. *read* 1g.

1413g Line 5. *For* TCA *read* 2,4-D

1655p Author. *For* Reddie *read* Reddi

2035 Text, Lines 14 and 15. *Change both lines to read* more rapidly in petunia, dwarf dahlia and dwarf salvia, and more slowly in geranium and *Capsicum frutescens*, as a result of treatment

2216 2nd Author. *For* Kishada *read* Kishaba

2294 Author. *For* Boubals, B. *read* Boubals, D.

2692 Text, Line 5. *For* N 100-100 *read* N 100-200

3021 Text, Line 2. *For* content *read* number

Volume XXVIII

125 Text, Line 5. *For* occurs *read* can be effectively carried out

125 Text, Line 9. *For* affected *read* effected

959u Author. *For* Hoyt, C. P. *read* Dumbleton, L. J.

2716m Title, Line 2. *For* vitamin O *read* vitamin C

3178a Text, Line 2. *For* contents *read* numbers

Volume XXIX

3699 Title, Line 6. For *Meded.* read *Publ.*

4052 Text, Line 4. *For* 70-98 kg. per bush *read* 70·98 kg. of cherry per bush

Volume XXX

2513 Text, Line 7. *For* 70-75° C. *read* 70-75° F.

3259 Text, Lines 6 and 7. *For* MM. *read* Merton

3387 Title. *For* Hilkenbäumer, F., Buchloh, G., and Zachariae, A. Beobachtungen über, etc., *read* Zachariae, A. Die Beziehungen zwischen Fruchtfleischbräune und Stickstoffhaushalt bei Äpfeln. (The relation between low temperature breakdown and nitrogen metabolism in apples.) [English and French summaries 7 and 8 lines.] *Gartenbauwiss.*, 1959, **24**, 8-17, bibl. 18.

3660 Title, Line 3. *For* **27**(4) *read* **28**(1)

5803 Text, Line 4. *For* and medium fine *read* or fine, medium or

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